

## Memorex Puts Fine Comb to Jury Selection

By E. Drake Lundell Jr.

CW Staff

SAN FRANCISCO — The jury impaneled here last week to hear the Memorex Corp. vs. IBM antitrust case was one of the best-researched ever with both sides using outside consultants — and even computers — in the jury selection process.

The eight-woman, four-man jury — selected last Monday even in the midst of rumors about settlement negotiations between the two firms — is a mixed bag, ac-

cording to one observer.

However, Memorex, which did far more research into the potential jurors, is happy with the jury. It believes the jury is a conscientious group that will be able to follow the case closely despite its complexities, according to Beth Benora from the National Jury Project, which was hired by Memorex for its jury screening work.

The project took a statistical sample of 825 potential jurors and conducted interviews with them to determine their attitudes

toward big business in general and IBM and Memorex in particular.

The information was compiled and sorted by a computer system, Benora said, adding that it "probably" wasn't an IBM system.

From that information, project personnel try to draw a profile of the type of juror that would be most favorable to the client, in this case Memorex.

However, this was difficult in this case, Benora said, because people's attitudes toward

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# COMPUTERWORLD

THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

Weekly Newspaper Second-class postage paid at Boston, Mass., and additional mailing offices ©1978 by CW Communications/Inc.

Vol. XII, No. 4

January 23, 1978

75¢ a copy; \$18/year

## Amdahl Revamps Prices

SUNNYVALE, Calif. — Amdahl Corp. chopped 9% off the price of its 470V/6-II and brought out a new minimum-configuration 470V/5 with 12 channels that costs 9% less than the previous eight-channel model. Lease terms are now five years.

The firm announced lease plans for the 470V/7; a 6M-byte unit costs \$86,225/mo. Maintenance prices were not changed, nor was the 470V/7 purchase price.

With 6M bytes of memory, a typical 470V/6-II previously priced at \$3.5 million now costs \$3.2 million and leases for \$75,950/mo.

The latest minimum-configuration 470V/5 with 4M bytes of memory and the now standard 12 I/O channels carries a \$2.4 million price tag compared with the previous cost of \$2.65 million for an eight-channel version; it leases for \$58,575/mo. An IBM 3032 with 12 channels is priced at \$2.5 million.

All 470V/5s shipped from this date will have the new 12-channel configuration, Amdahl said.

## Users Award Xerox, Amdahl Top Grades in Annual Survey

By E. Drake Lundell

CW Staff

DELRAN, N.J. — Computer equipment from Xerox Corp. and Amdahl Corp. ranked first and second respectively in overall user satisfaction in this year's Datapro Research Corp. computer users survey.

The results are noteworthy, since Xerox Corp. no longer even makes or supports its systems, and Amdahl Corp. is a relative newcomer to the business.

In the survey, which attracted 1,790 responses representing user experience with 2,253 mainframes, from a variety of manufacturers, Digital Equipment Corp. was the only other mainframer to receive better than average ratings from its systems users.

In overall satisfaction, Control Data Corp., IBM, NCR Corp. and Univac equipment received average replies, while gear from Burroughs Corp. and Honeywell Information Systems, Inc. was rated below average by the users.

The survey, which was mailed to 20,000 Datapro subscribers, asked each computer user to rate the performance of its equipment — and the firm behind it — in 12 different categories.

The users assigned ratings of excellent (4), good (3), fair (2) or poor (1) to each of these categories and Datapro then calculated a weighted average for each.

In overall satisfaction, the 16 Xerox users gave the firm a 3.5 score, while the seven Amdahl users responding rated that firm 3.4 and the 27 DEC users rated DEC 3.3.

CDC, with 23 responses, got a 3.1 rating, as did IBM with 1,291 users, NCR with 70 users and Univac with 78 users responding.

Burroughs, which was rated by 146 users, got a 3.0 rating and HIS was at the bottom of the list with a 2.9 rating from its 130 users.

Two Intel Corp. users also replied to the survey, but their responses were not ranked with those for the other companies since Datapro requires a minimum of six replies for such rankings.

However, Datapro noted that the two

## SSA Files Opened to Fraud Probes

By Edith Holmes

CW Staff

WASHINGTON, D.C. — Legislation that bolsters the Department of Health, Education and Welfare's (HEW) crackdown on welfare cheaters through computer cross-checks is on the books.

Michigan has uncovered 6,000 possible welfare cheaters by cross-checking the employee records of four companies — including the Big Three auto makers — against the state relief roster. Story on Page 7.

But the Social Security Amendments Act of 1977, passed late last month, has stirred concern among those on Capitol Hill who fear it could turn out to be another threat to individual privacy rights.

Public Law 95-216 directs HEW Secretary Joseph A. Califano Jr. to make wage information contained in Social Security Administration (SSA) files available to state and local welfare

agencies to help them determine an individual's eligibility for aid or services.

The new law also commands the secretary to establish safeguards to ensure that wage data for individuals isn't used for purposes other than reducing fraud and determining benefit amounts.

Congressional concern centers on the number of questions this section of the

law raises — in particular, its relationship to the Privacy Act of 1974.

For the past several months, HEW's Inspector General has used computer technology to purge the nation's welfare rolls of those federal employees who were illegally receiving funds from the Aid to Families With Dependent Children (AFDC) program [CW, Nov. 21].

(Continued on Page 6)

## PL/I Joins Ranks of DG Mini Languages

By Don Leavitt

CW Staff

BERKELEY, Calif. — Data General Corp. has announced a PL/I language facility for its Eclipse minicomputers and a user at the University of California's campus here, where it has been in place for nearly nine months, gave it high marks across a range of applications.

DG claimed the software, scheduled for general release in late March, will be the first PL/I available from any major minicomputer vendor. While

that appears to be true, IBM — a latecomer on the mini scene — won't be far behind; it has announced PL/I for the Series/1 and said it will be ready in April.

The language has, until now, been used on large mainframes for computational operations and business-oriented DP as well as for systems programming since it provides the primary capabilities of Fortran, Cobol and Algol while at least encouraging a structured approach to programming.

In the Quantitative Anthropology

Laboratory at the university here, Prof. William H. Geoghegan said PL/I on an Eclipse C/330 "has been involved in everything from systems programming to document processing, report generation, preprocessing of graphics data and statistical applications that involve heavy number-crunching."

One of the systems programming chores handled for the lab by DG's PL/I was setting up the means of transferring large volumes of data between the Eclipse and a Nova 2/10

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Second-class postage paid at Boston, Mass., and additional mailing offices PN127420. Published weekly (except: a single combined issue for the last week in December and the first week in January) by CW Communications/Inc. Copyright 1978 by CW Communications/Inc. All rights reserved. Reproduction of material appearing in *Computerworld* is strictly forbidden without written permission. Send all requests to Marion Kibbee.

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*Computerworld* can be purchased on 35 mm microform through University Microfilm Int., Periodical Entry Dept., 300 Zeeb Rd., Ann Arbor, Mich. 48106. Phone: (313) 761-4700. *Computerworld* is indexed: write to Circulation Dept. for subscription information.

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## Holding Company Act Cited Bank Sued for Alleged DP Tie-In

By Don Leavitt  
CW Staff

CHICAGO — Statistical Tabulating Corp. (Stat-Tab), a Chicago-based DP service organization, has brought suit in federal district court here charging Northern Trust Co. with a violation of the Bank Holding Company Act.

Filed in late December, the suit seeks \$50,000 in damages, subject to trebling, based on an allegedly illegal tie-in requirement involving the sale of

cashier's checks and payroll processing. Stat-Tab charged that Northern, a bank holding company, refused to sell cashier's checks to customers for payroll purposes unless the customer's payroll was processed through the bank.

Northern had until last Thursday to respond to the complaint formally. Earlier in the week, however, a spokeswoman asserted that the bank's actions have been "proper and not in

violation of the prohibitions against tie-ins contained in the Bank Holding Company Act" as amended by Congress.

Payroll processing for Northern and its customers is done by the Midwestern subsidiary of Automatic Data Processing, Inc. (ADP) under terms of an agreement signed in late 1976. Northern receives a percentage of the revenues generated by this agreement, Stat-Tab claimed.

The Northern-ADP agreement itself is one of the subjects of another federal suit, filed 15 months ago, in which Stat-Tab charged ADP with attempting to obtain a monopoly in Chicago and other metropolitan areas.

### Reminiscent of Late '60s

Stat-Tab's suit against Northern was reminiscent of actions in the late 1960s when a number of banks were challenged by independent service bureaus for offering DP services not directly related to their primary financial services.

The Bank Holding Company Act permitted creation of holding companies to provide management and services, including DP, for groups of banks. Since the holding company was not legally a bank it could offer DP services beyond those that were bank-related, according to the statute.

In 1970, Congress amended the Bank Holding Company Act so that a "one-bank" holding company was deemed legal, and such a holding company could offer DP services provided they met tests for need and didn't involve tie-in between DP and other service offerings.

Stat-Tab's antitrust suit against ADP — still pending and unlikely to reach trial this year, in the view of one observer — is "without merit," Richard Patterson, ADP's vice-president for finance, said last week, echoing comments carried earlier in the company's annual report.

## High Court Refuses IBM; Greyhound to Get Retrial

WASHINGTON, D.C. — The antitrust case filed by Greyhound Computer Corp. against IBM will have another trial, despite IBM's objections to the U.S. Supreme Court on that ruling.

The high court recently denied IBM's motion to review the U.S. Ninth Circuit Court of Appeals' order for a new trial.

There is a procedure by which IBM

may petition the Supreme Court for a rehearing. However, an IBM spokesman said the firm has made no decision on whether to follow that route.

"We recognize that petitions to the Supreme Court are rarely granted, especially when a matter has not been fully adjudicated in all the lower courts," he said.

The original Greyhound antitrust trial was dismissed with a directed verdict in 1972, and the Ninth Circuit took five years to order a new trial, which it did in August 1977. IBM subsequently took the ruling to the Supreme Court [CW, Dec. 12].

In addition to the Greyhound antitrust case, IBM has several other trial engagements simmering. The California Computer Products, Inc. case was also dismissed with a directed verdict and is being appealed [CW, Sept. 5]. The Memorex Corp. case started last week and meantime, the case of U.S. vs. IBM trudges onward in Foley Square, New York.

IBM had argued in its brief to the Supreme Court that letting stand the Ninth Circuit's order would "intimidate vigorous competition on the merits," burden lower federal courts and harm defendants.

## SCDP Sets Election

MEMPHIS, Tenn. — The Society of Certified Data Processors (SCDP) is conducting elections for its top officers and board of directors, and unless someone mounts a staggering write-in campaign, the following slate will be elected: G. Gary Casper, president; Thomas W. Briggs II, vice-president; Errol S. Pringle, secretary; and Frank Sellgren, treasurer.

Each is running unopposed for a two-year term.

Seven candidates are competing for six two-year terms on the board of directors. They are Lee Gruenfeld, Tom Kurihara, William P. LaPlant, Santiago Levy, Walter Seyffert, Elmer Swartzmeyer and Pat Watt.

Results will be announced by Feb. 1.

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# Xerox, Amdahl Praised by Users

(Continued from Page 1)

responses represented 20% of the Ite base at the time of the survey and added that the firm, if ranked, would have placed first in three out of the 12 categories and tied for first place in three others.

But while the overall satisfaction categories give a quick snapshot of what users think of their equipment, there are a great many differences in the other 11 categories rated by users and an individual look at the equipment from each manufacturer quickly pinpoints their strengths and weaknesses.

For example, Burroughs won the software laurels with first place in compilers and assemblers and a tie for first place (with Xerox) in operating systems. In addition, the operating systems for DEC and Univac were also rated above average.

It is also interesting to note that the Xerox scores were pulled down considerably by the categories of maintenance and technical support, which are now handled by HIS since Xerox has left the mainframe business.

Here is a rundown by manufacturer in order of their finish in the overall survey. The rankings are based on the weighted average user ratings and there are many ties within the rankings. A full chart showing the user ratings by manufacturer and model is shown at the left.

In addition to overall satisfaction, Xerox was in the No. 1 position only in the area of operating systems and was tied for that place by Burroughs.

However, it was No. 2 in compilers and assemblers and tied for second place in ease of operation and reliability of mainframe. It also tied for third place in the "ease of programming" category.

Xerox tied for fourth place in reliability of peripherals, but its ranking fell off in the areas of responsiveness of maintenance and effectiveness of maintenance, where it was in a tie for sixth place.

It also tied for sixth place on technical support and applications programming and was in fifth place in regard to ease of conversion.

## Amdahl Takes Two No. 1s

Amdahl's strengths were in the areas of ease of conversion, where it ranked No. 1, and in responsiveness of maintenance service, where it was also No. 1. In addition, the firm tied for top ranking in the categories of technical support and applications programs.

It captured second place in the area of effectiveness of maintenance service and tied for the No. 2 spot in the area of reliability of mainframe and reliability of peripherals.

The firm tied for the No. 4 rank on ease of operation, but tied for fifth place in the operating systems and the compilers and assemblers categories. It ranked No. 6 in ease of programming.

DEC placed well — No. 1 — in the ease of programming category and No. 2 in the ease of conversion and operating systems areas. Furthermore, it tied for second place in reliability of peripherals, but slipped to a sixth-place tie in the applications programs category and ranked fifth in the technical support area.

CDC ranked sixth in both the ease of operation and reliability of mainframe areas but tied for third place in the reliability of peripherals and responsiveness of maintenance service areas.

In the ease of programming category, CDC tied for sixth and in the ease of conversion category it was in the eight slot.

IBM ranked No. 1 in reliability of peripherals and came out No. 2 in technical support. It stood in third place in mainframe reliability and effectiveness of maintenance and tied for third in responsiveness of maintenance service and applications programming.

IBM tied for fourth in the categories of ease of

(Continued on Page 5)

Manufacturer and Model	No. of User Replies	No. of Computers Represented	Weighted Average User Ratings											
			Ease of Operation	Reliability of Mainframe	Reliability of Peripherals	Responsiveness of Maintenance Service	Effectiveness of Maintenance Service	Technical Support	Operating Systems	Compilers and Assemblers	Applications Programs	Ease of Programming	Ease of Conversion	Overall Satisfaction
Amdahl 470V/6	7	7	3.3	3.6	3.0	3.6	3.4	3.0	3.0	3.0	3.0	2.8	3.7	3.4
Burroughs B 1700 Series	30	34	3.8	3.0	2.4	2.6	2.3	2.2	3.6	3.4	2.9	3.5	3.2	3.0
Burroughs B 2700 Series	21	22	3.8	3.2	2.4	2.7	2.6	2.1	3.9	3.5	2.4	3.5	3.2	3.2
Burroughs B 3500 Series	15	18	3.4	3.7	2.3	2.7	2.5	2.2	3.7	3.3	2.4	3.5	3.3	3.1
Burroughs B 3700 Series	19	22	3.7	3.2	2.4	2.6	2.1	2.2	3.7	3.7	2.5	3.5	2.9	2.9
Burroughs B 4700 Series	31	44	3.8	3.3	2.2	2.7	2.4	2.0	3.7	3.4	2.4	3.5	2.9	3.0
Burroughs B 5700 Series	3	4	4.0	2.3	2.3	2.3	1.7	1.3	4.0	3.3	2.7	3.3	2.7	2.2
Burroughs B 6700 Series	21	28	3.6	3.0	2.5	2.8	2.5	2.6	3.8	3.4	2.5	3.5	3.2	3.1
Burroughs B 7700 Series	2	2	4.0	3.5	2.5	3.0	3.0	3.0	4.0	4.0	3.5	4.0	4.0	4.0
Burroughs, others	4	4	3.5	3.8	2.5	3.3	3.3	2.5	3.7	3.5	1.0	3.3	3.0	3.0
BURROUGHS TOTALS	146	178	3.7	3.2	2.4	2.7	2.4	2.2	3.7	3.5	2.5	3.5	3.1	3.0
Control Data Cyber 70 & 170	5	6	3.6	3.2	2.8	3.8	3.3	2.6	2.8	3.2	3.0	3.2	3.0	3.6
Control Data 3000 Series	6	7	2.7	2.7	2.7	3.3	2.8	2.5	2.6	2.7	2.2	2.5	2.3	2.8
Control Data 6000 Series	10	11	3.0	3.0	2.7	3.0	3.0	2.7	3.1	3.2	2.8	2.8	2.7	3.1
Control Data 7600 Series	2	2	2.5	3.0	2.0	3.0	3.0	2.5	2.5	3.5	3.0	3.0	3.0	3.0
CONTROL DATA TOTALS	23	26	3.0	3.0	2.7	3.3	3.0	2.6	2.9	3.1	2.6	2.8	2.7	3.1
Digital Equip. DECsystem-10	22	23	3.6	3.3	2.9	3.1	3.1	2.4	3.5	3.2	2.4	3.6	3.4	3.3
Digital Equip. DECsystem-20	5	5	3.6	4.0	3.2	3.0	3.2	2.6	3.8	2.8	2.0	3.8	3.6	3.6
DIGITAL EQUIP. TOTALS	27	28	3.6	3.4	3.0	3.1	3.1	2.5	3.5	3.1	2.4	3.7	3.4	3.3
Honeywell Model 58	3	3	3.3	3.3	2.7	3.0	2.7	2.0	2.0	2.0	2.0	3.3	3.0	2.3
Honeywell Level 62	7	7	3.4	3.7	3.4	3.9	3.6	2.9	2.9	3.1	3.3	3.3	2.6	3.4
Honeywell Level 64	10	11	3.3	3.1	2.4	2.7	2.4	2.2	3.0	2.9	1.8	2.9	2.8	2.6
Honeywell Level 66	24	28	3.5	3.6	3.0	3.1	2.8	2.6	3.5	3.2	2.6	3.2	2.7	3.3
Honeywell Series 2000	29	30	3.1	3.1	3.0	2.8	2.7	2.3	2.9	2.9	2.5	3.0	2.8	2.9
Honeywell Series 6000	20	46	3.4	3.2	2.7	3.0	2.9	2.7	3.7	3.4	2.8	3.3	3.0	3.1
Honeywell Series 200	28	42	2.9	2.7	2.4	2.8	2.6	2.1	2.5	2.6	2.2	2.9	2.5	2.8
Honeywell Series 600	2	4	2.5	2.5	2.5	2.5	2.0	2.0	3.0	3.0	2.5	2.5	2.0	2.0
Honeywell G-400 Series	3	4	2.7	3.3	2.3	2.0	2.3	1.7	3.3	3.3	2.3	4.0	2.3	3.0
Honeywell, others	4	4	3.3	3.5	2.8	3.3	3.0	1.8	2.8	2.8	2.3	2.8	2.3	3.0
HONEYWELL TOTALS	130	179	3.2	3.2	2.7	2.9	2.7	2.4	3.0	3.0	2.9	3.1	2.7	2.9
IBM 360/20	5	5	3.2	3.4	3.2	3.4	3.4	3.0	3.4	3.4	2.8	3.2	3.2	3.4
IBM 360/30	59	64	3.1	3.4	3.1	3.3	3.1	2.7	3.0	3.1	2.9	3.1	2.9	3.1
IBM 360/40	60	65	3.2	3.4	3.0	3.1	2.9	2.6	3.0	3.0	2.7	2.9	2.8	3.1
IBM 360/44	3	3	2.7	3.0	3.0	3.3	2.7	2.5	3.0	3.0	2.0	3.0	2.0	3.5
IBM 360/50	53	55	3.1	2.8	2.9	3.0	2.9	2.6	2.9	3.0	2.6	2.9	2.8	2.8
IBM 360/65	46	51	3.3	3.2	2.8	3.2	2.9	2.9	3.3	3.2	2.6	3.0	2.9	3.1
IBM 360/67	5	6	3.0	2.6	3.5	3.4	3.6	2.8	2.8	1.5	3.0	2.5	3.0	3.0
IBM 360/75	2	2	2.5	3.5	2.0	4.0	3.5	2.0	3.0	3.5	3.5	3.0	2.5	3.0
IBM System/360, others	9	11	3.6	3.4	3.3	2.9	2.5	2.6	3.0	3.1	2.8	3.3	2.9	3.3
IBM System/360 Totals	242	262	3.2	3.2	3.0	3.2	3.0	2.7	3.0	3.1	2.7	3.0	2.8	3.0
IBM 370/115	36	37	3.4	3.7	3.4	3.4	3.2	2.8	2.8	3.0	2.7	3.4	2.7	3.1
IBM 370/125	51	55	3.2	3.7	3.5	3.3	3.3	3.0	2.9	3.1	2.9	3.0	3.0	3.2
IBM 370/135	118	259	3.2	3.7	3.3	3.3	3.2	3.0	2.9	3.1	2.8	3.0	2.8	3.1
IBM 370/138	59	61	3.2	3.7	3.2	3.2	3.1	3.0	2.9	3.1	2.8	3.0	3.0	3.1
IBM 370/145	181	199	3.3	3.5	3.2	3.3	3.2	3.0	2.9	3.1	2.7	2.9	2.8	3.1
IBM 370/148	49	49	3.2	3.6	3.3	3.4	3.3	3.1	2.9	3.1	2.7	3.0	2.9	3.1
IBM 370/155	56	72	3.3	3.5	3.1	3.3	3.2	2.8	2.9	3.1	2.7	2.9	2.7	3.1
IBM 370/158	224	266	3.3	3.6	3.3	3.4	3.2	3.0	3.1	3.1	2.8	3.0	2.8	3.2
IBM 370/165	15	20	3.3	3.4	2.9	3.1	3.1	2.9	2.9	3.3	2.9	3.2	3.0	3.1
IBM 370/168	67	103	3.2	3.3	3.2	3.4	3.1	3.1	3.0	3.2	2.8	3.0	2.8	3.1
IBM System/370, unspecified	8	9	3.3	3.8	3.4	3.6	3.4	3.4	2.6	2.8	3.1	3.1	2.6	3.4
IBM System/370 Totals	864	1130	3.3	3.6	3.3	3.3	3.2	3.0	3.0	3.1	2.8	3.0	2.8	3.1
IBM System/3 Model 6	5	5	3.6	3.6	3.6	3.6	3.8	3.4	3.2	3.4	3.3	3.4	3.5	3.4
IBM System/3 Model 8	10	11	3.3	3.8	3.6	3.2	3.2	2.9	3.3	3.2	2.7	3.2	2.8	3.5
IBM System/3 Model 10	31	32	3.4	3.7	3.4	3.5	3.4	2.9	3.4	3.4	2.7	3.4	2.9	3.3
IBM System/3 Model 12	21	22	3.7	4.0	3.5	3.4	3.5	3.0	3.2	3.2	3.0	3.5	3.5	3.4
IBM System/3 Model 15	43	45	3.4	3.7	3.4	3.4	3.4	3.0	3.1	3.2	2.8	3.3	3.1	3.2
IBM System/3, unspecified	9	10	3.4	3.7	3.4	3.2	3.0	2.7	3.2	3.1	2.4	3.4	2.8	3.1
IBM System/3 Totals	119	125	3.5	3.8	3.4	3.4	3.4	3.0	3.2	3.2	2.8	3.4	3.1	3.3
IBM System/32	36	93	3.6	3.8	3.6	3.6	3.5	3.1	3.3	3.2	2.7	3.3	3.1	3.3
IBM 1130	14	15	3.1	3.7	3.0	3.4	2.9	2.3	2.5	2.5	2.4	2.8	2.4	3.0
IBM 1401	8	8	2.9	2.9	2.3	2.9	2.4	2.7	3.0	3.7	4.0	2.3	1.6	2.6
IBM 1800	8	14	2.9	3.8	2.9	3.0	3.3	2.6	3.4	3.1	3.2	2.9	2.3	3.3
IBM TOTALS	1291	1647	3.3	3.5	3.2	3.3	3.2	2.9	3.0	3.1	2.8	3.0	2.8	3.1
Itel AS/4 and AS/5	2	2	4.0	4.0	3.0	3.5	4.0	3.0	3.0	3.0	3.0	3.0	—	3.5
NCR Century 50 & 100	7	8	3.1	2.4	2.6	3.4	2.7	2.1	2.9	2.6	2.5	2.9	2.7	2.7
NCR Century 101	19	24	3.4	3.6	2.8	3.3	2.9	2.2	3.2	3.1	2.9	3.3	3.3	3.2
NCR Century 151	6	6	3.2	3.2	2.7	3.2	2.7	2.7	3.0	3.0	2.4	3.0	3.2	3.0
NCR Century 200	6	6	2.7	3.2	2.5	3.0	3.0	1.3	2.3	2.5	1.8	3.2	3.0	2.8
NCR Century 201	13	14	3.3	3.8	3.1	3.4	2.6	2.2	3.5	3.3	3.4	3.4	3.4	3.2
NCR Century 251	6	7	3.3	3.5	3.0	3.8	3.3	2.7	3.0	3.0	2.3	3.0	3.0	2.8
NCR Century 300	5	8	3.3	3.0	2.4	2.8	2.6	2.2	2.8	2.6	3.0	2.8	2.2	2.8
NCR Century Totals	30	35	3.2	3.4	2.8	3.3	2.8	2.1	3.0	3.0	2.8	3.2	3.0	3.0
NCR 8500 Series	8	8	3.4	3.6	3.3	3.6	—	3.1	3.1	3.1	3.1	3.5	3.6	3.2
NCR TOTALS	70	75	3.3	3.4	2.8	3.3	2.9	2.3	3.1	3.0	2.8	3.2	3.2	3.1
Univac Series 70	19	26	3.2	3.4	2.8	3.2	3.2	2.7	3.3	3.2	2.7	3.1	2.8	3.1
Univac 9200	3	3	3.3	3.3	2.5	2.3	2.3	—	2.5	—	—	3.5	—	3.0
Univac 9300	4	4	3.3	3.5	2.8	3.5	3.5	3.3	3.0	2.5	3.0	3.3	3.0	3.3
Univac 9400 & 9480	9	9	3.1	3.1	2.9	3.2	2.7	2.3	3.1	3.0	2.1	3.0	2.9	2.8
Univac 9000 Series Totals	16	16	3.2	3.3	2.8	3.1	2.8	2.6	3.1	2.8	2.2	3.1	2.9	2.9
Univac 90/30	15	16	3.3	3.3	2.9	3.3	3.1	2.7	3.5	3.4	3.0	3.3	3.1	3.3
Univac 90/60, 90/70, 90/80	8	8	3.4	3.4	3.1	3.4	3.4	2.7	3.4	3.5	3.3	3.4	3.3	3.3
Univac 90 Series Totals	23	24	3.3	3.3	3.0	3.3	3.2	2.7	3.5	3.4	3.1	3.3	3.2	3.3
Univac 1100/10	1	1	3.0	3.0	3.0	4.0	3.0	—	3.0	3.0	2.0	3.0	3.0	3.0
Univac 1100/42	2	2	3.2	3.2	3.2	4.0	3.0	2.5	3.0	3.0	4.0	2.0	2.0	3.0
Univac 1106	6	6	3.7	3.2	3.5	3.0	2.8	3.0	3.5	3.5	3.5	3.5	2.7	3.2
Univac 1108	9	11	2.8	2.7	2.7	2.9	2.9	2.1	3.1	3.1	2.5	3.1	2.6	2.7
Univac 1110	2	3	4.0	4.0	3.5	4.0	4.0	4.0	4.0	4.0	3.0	4.0	3.0	4.0
Univac 1100 Series Totals	20	23	3.3	3.1	3.1	3.2	3.0	2.7	3.3	3.2	2.9	3.2	2.6	



# User 'Fires' Computer, Says Staff Works Faster

By Ann Dooley  
CW Staff

CINCINNATI — Health Maintenance Plan, a group health organization here, canceled a computer's appointment permanently when it learned its employees could do the work five times faster than an automated appointments service.

The company bought the service from Meditech, Inc. in 1974 after deciding it needed a more efficient recordkeeping method, according to administrator Paul Beckman. It hoped automating its manual system would free its staff for other duties.

Instead, patients wanting to make an appointment were kept waiting as long as five minutes, and Health Main-

tenance had to add an extra staff member to deal with the waiting patients.

"We tried not to even mention it was a computer at fault because we felt it would turn some people off," Beckman said. "Mostly we just apologized a lot."

The problems with the system came to light recently when Health Maintenance published a review of its current, manual appointment-keeping system in its newsletter.

Almost everything was wrong with the DP system, Beckman said. "There were problems with both the hardware and the software, as well as the phone lines linking us to the computer" at Meditech in Riverdale, Md., he added.

The service was bought with the intention of expanding to a full medical

records system. Health Maintenance, a prepaid health plan, started out with the appointments system to handle its 19,000 members; after struggling with the system for nearly a year, however, it decided to scrap it, Beckman said.

When the system was in operation at Health Maintenance, a staff member would key in on a CRT the patient's name, the requested doctor and the amount of time needed for the appointment. Meditech's computer would verify if the person was a group-health member and then indicate an available time.

After the appointment was made, the system would record the patient's name, home telephone number, doctor and appointment time and date.

But the system never ran as smoothly

as it should have, Beckman claimed. Meditech used Digital Equipment Corp.'s PDP-15s past their capacity, he said.

In addition, response time depended on how many other customers were using the system at the same time, he contended.

The software itself was not designed to be too speedy, according to Beckman. The program was prewritten and didn't fit the organization's needs or way of operating exactly, he said.

The automated system took anywhere from three to five minutes to complete an appointment, but it only takes 30 seconds to a minute with the manual method, he said.

Attempts to reach Meditech were unsuccessful.

## Users Applaud Xerox, Amdahl

(Continued from Page 4)

operation and compilers and assemblers, and it got a fifth-place tie for operating systems and ease of programming. The firm was rated seventh in ease of conversion.

NCR's best rating came in ease of conversion, where it was rated third and it also tied for third place in responsiveness of maintenance service, applications programming and ease of programming.

It is in the fourth spot for operating systems and tied for fourth in ease of operation, reliability of mainframes and reliability of peripherals categories. It dropped to a sixth place tie in effectiveness of maintenance service and was in seventh place on technical support.

### Average Scorer

Univac scored about average in most categories, getting the No. 3 place for reliability of peripherals, technical support, operating systems and compilers and assemblers and tying for third in applications programs and ease of programming.

It took fourth place on responsiveness of maintenance service and tied for fourth in ease of operation and effectiveness of maintenance service.

Univac wound up in a fifth-place tie in the category of mainframe reliability and was in sixth place in the area of ease of operation.

Burroughs topped the chart in compilers and assemblers, tied for No. 1 in operating systems and tied for No. 2 in ease of operation.

However, this showing was offset by its ranking in maintenance, where it was No. 7 in responsiveness and No. 8 in effectiveness. Furthermore, it was No. 8 in technical support.

HIS, low man on the totem pole, received its highest grades for applications programs, where it ranked No. 2, and in reliability of peripherals, where it tied for third. In ease of programming, it was No. 4.

However, it did not fare as well in other areas such as ease of operation (fifth), reliability of mainframe (tied for fifth), responsiveness of maintenance service (tied for sixth), effectiveness of maintenance (seventh), technical support (a sixth-place tie) and in operating systems and compilers and assemblers, in both of which it tied for fifth.

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CW 1/23/78



# \$416 Million Outstanding HEW Widens Search for Student Loan Dodgers

By Nancy French  
CW Staff

WASHINGTON, D.C. — The Department of Health, Education and Welfare (HEW) has launched a drive to collect \$416.7 million in unpaid student loans by matching computerized payroll records of federal employees with those of delinquent students.

The government-wide project is an outgrowth of a trial matching of delinquent student records, maintained on magnetic tape by HEW, against the agency's own payroll files. The names of 316 HEW employees matched those of students who have defaulted on their loans, according to an agency spokesman.

Records are being matched by name, address, birthdate and Social Security number (SSN), according to Robert Wilson of the Inspector General's Office.

## No Privacy Act Violation

The use of Civil Service Commission files in this manner is not a violation of the Privacy Act of 1974, according to Charles Ruff, also of the Inspector General's Office, who said the question was thoroughly researched before the project was undertaken.

As Ruff explained, the Inspector General has jurisdiction over all cases of fraud associated with HEW programs — of which the Federal Insured Student Loan Program is one — and has the authority to obtain files from any agency, such as the Civil Service Commission, that might be needed in investigations.

The matching projects are being run under an agreement between the Civil Service Commission and HEW that calls for the "strictest" regard for privacy and security procedures on the part of the HEW audit personnel who will be handling the information.

The student matches will be run in the next week or so on HEW's IBM 370/168 — the same system the agency

used to match federal employee records against those of individuals receiving Aid to Families with Dependent Children, (AFDC) [CW, Nov. 21].

## Touches 2.8 Million People

The records of some 2.8 million federal civilian workers will be checked before the project is completed, Ruff said.

Under the Federal Insured Student Loan Program, a leg of the Guaranteed Student Loan Program, students obtain loans through banks and other lending institutions. They have up to 10 years to repay the debt after

graduating or leaving school.

Most repay, a spokeswoman said, but when a student defaults, the lender is reimbursed by the federal government and the government takes over responsibility for collecting the debt.

HEW Secretary Joseph A. Califano has named Leo I. Kornfeld director of the Student Finance Assistance Program within HEW's Office of Education, and it is through this office the collection program will be handled.

A former vice-president of Automatic Data Processing Corp., Kornfeld is expected to institute collection techniques used in private industry in the student loan default program. This

includes such measures as skip tracing and collection agencies, an HEW spokesman said.

After obtaining the raw computer matches, program administrators will send letters to each defaulter at his "federal" — business — address. The letters will instruct the defaulter to contact the nearest HEW regional office, and a payroll deduction plan will be offered to those who desire such a repayment arrangement.

"If that doesn't elicit a response, we'll probably contact them through personnel channels," the spokesman said, adding, "information will be extremely restricted" for the sake of privacy.

# Law Gives Go-Ahead for File Matching

(Continued from Page 1)

With the passage of the Social Security Amendments Act, Califano announced that state welfare agencies will expand their efforts against cheating by matching welfare rolls and Social Security payroll records.

"A key element in the controversy that is brewing will be the safeguards the HEW secretary draws up and when they will go into effect," one congressional source said.

"None of the information contained in the SSA files has ever been used for this kind of thing before. The regulations restricting the use of this data are major issues," he added.

There is an additional problem with Section 411, "access to wage information," in the new law, other sources stated. Social Security has wage data as a result of the tax system, they noted.

Nowhere does the new law clarify what restrictions accompany data moving from the Internal Revenue Service (IRS) to the SSA, the sources said. The Tax Reform Act of 1976 contains "a much more elaborate" system for protecting this information than the Social Security law's direction

that the HEW secretary "establish such safeguards as are necessary," they added.

The act governing the IRS specifically calls for periodic audits by the General Accounting Office (GAO) of the protections given this data, the sources stated.

## Effective in '79

Effective Oct. 1, 1979, state and local welfare agencies will have to use wage information from the SSA to determine AFDC eligibility and benefit levels, according to the new law.

Other than the section's opening clause, which states that "notwithstanding any other provision of the law," the HEW secretary will make this data available to the state and local agencies, there is no reference to the Privacy Act or the Tax Reform Act, another source said.

The new law could be used by HEW as a means of bypassing the Privacy Act when it comes to record-matching schemes to reduce fraud and abuse, he suggested.

When he announced "Project Match," Califano received criticism on

privacy grounds from Rep. Richardson Preyer (D-N.C.), chairman of the House Government Information and Individual Rights Subcommittee, and David F. Linowes, former chairman of the Privacy Protection Study Commission.

Under the Privacy Act, an agency must notify those individuals whose files they wish to use for other than "routine uses" — or those purposes for which the information was originally collected. Routine uses need only be published annually in the *Federal Register*.

Perhaps in reaction to criticisms that its anti-fraud campaign runs the risk of violating individual privacy rights, HEW published in the Jan. 6 *Federal Register* a new "routine use" for its Inspector General's system of records.

To facilitate Project Match, HEW stated in the register that records from the Inspector General's system "may be disclosed as a routine use to a federal, state or local agency maintaining pertinent records, if necessary to obtain a record relevant to a department decision concerning the hiring or retention of an employee, the issuance of a security clearance, the letting of a contract or the issuance of a license, grant or other benefit."

The new routine use for the Inspector General's records system will go into effect Feb. 5. Unless public comments persuade HEW to follow another course of action.

## Security Precautions

HEW spelled out the security precautions it takes to ensure the privacy of the information it has collected from other agencies.

As soon as the data has been collected, all original source computer tapes are promptly returned to the source or destroyed, the article in the *Federal Register* stated.

The records collected by this process will be carefully validated to confirm that each individual identified is or has been in fact employed by the federal agency and at the same time is or was illegally in receipt of AFDC payments, HEW said in the routine use notice.

Anyone interested in sending comments to HEW about its new routine use should write to Acting Director, Fair Information Practices Staff, Department of Health, Education and Welfare, 200 Independence Ave., S.W., Washington, D.C. 20201.

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# Search for Welfare Cheats Hits Private Sector

By Jeffery Beeler  
CW Staff

LANSING, Mich. — A state government search of four nearby companies' payrolls has netted 6,000 possible cases of welfare fraud in what officials here are terming the biggest computer cross-checking operating of its sort ever undertaken in Michigan.

The search of Chrysler, General Motors, Ford Motor Co. and Detroit Edison Co. employee records represents the latest effort in a year-old campaign to catch welfare cheaters by computer-checking the Social Security numbers (SSN) and other identifiers of individuals on state relief.

The investigation has attracted attention for at least three reasons:

- It signals the spread of the state's welfare fraud search from the public to the private sector. All previous investigations of welfare cheating in Michigan have focused only on government employees.

- It marks a growing interest at both state and federal government levels in the use of computers for welfare fraud detection.

- It threatens to further intensify the national debate over the possible privacy risks posed by computer checks of SSNs.

Since Dec. 10, 1976, the Inspector General's Office of the Michigan Social Services Department (SSD) has conducted eight computer searches for possible welfare violators, a spokeswoman here said. Besides the records of the four private organizations, investigators have examined state income tax returns, the state government payroll and the employee records of U.S. Post Office and Internal Revenue Service employees in Detroit.

They have also cross-checked welfare records in Ohio and Illinois and investigated the Michigan Employment Security Commission's unemployment compensation files in Kent County, which includes Grand Rapids.

## Cheaters Uncovered

Before the most recent series of cross-checks, the computer dragnet had yielded 4,391 investigations, 80% of which have already been finished, the spokeswoman said. Of the approximately 3,600 completed investigations, slightly more than 1,200 showed evidence of welfare fraud, with the remaining 2,397 suspects apparently innocent of any wrongdoing.

Warrants have been issued to most of the suspects from the earlier fraud investigations, and some of the cases have already been decided in court.

The computer checks have also prompted SSD officials here to shut off 372 public assistance grants and reduce 219 others, the spokeswoman added.

How many suspects from the latest series of cross-checks will prove guilty of welfare cheating will remain unknown until members of the Inspector General's Office complete their current investigation.

The state's procedure for hunting welfare cheats differed slightly in each of eight investigations. In most of the checks involving government agencies, investigators compared the payroll records of the target employer against a list of Michigan residents on state relief. They then listed as suspect any persons the computer cross-check

found on both sets of data.

In many but not all instances, the identifiers used in the computer matching were SSNs. Other identifiers included names, addresses and dates of birth, the spokeswoman explained. The matching of relief recipients and employees for most of the searches was performed on computer systems in one or another agency of the state government.

With the private companies, however, state investigators took a somewhat different approach in their checks. They transferred the SSNs of all state welfare recipients onto magnetic tape and set copies of the recorded data to each of the cooperating companies, which used their own computer systems to check for matches be-

	State Income Tax Records	State Payroll	Post Office Employment Records, Detroit	Illinois Aid to Depen- dent Chil- dren Records	Ohio Aid To Depen- dent Chil- dren Records	Employment Security Commission Records, Kent County	IRS Em- ployment Records, Detroit
Grants Closed	225	33	50	15	17	1	31
Grants Reduced	207	8	4	0	0	0	0
Cases of Fraud	845	113	131	15	17	27	55

To identify welfare cheaters, the state of Michigan cross-checked its relief rolls against seven sets of government records. The results of that cross-check and the disposition of the cases appear above.

tween the state's tapes and their own employee records.

Although the latest computer cross-check will probably uncover some instances of welfare fraud, the procedure

the state used to accomplish that feat profoundly troubles some officials, including Jeff Ostahowski, an aide to U.S. Rep. Dale Kildee (D-Mich.). Os-

(Continued on Page 8)

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# DG's PL/I Extends Language Choices for Eclipse

(Continued from Page 1)

through the Multiprocessor Communications Adapter. Using PL/I instead of Assembly language "reduced development time considerably, but still gave us programs that met our execution speed requirements," Geoghegan said.

The lab's document processor program performed margin adjustments and justification, automatic paging and line spacing. PL/I's "extensive string-handling capabilities and procedural organization made the programming much easier than it would have been in Basic or one of the Fortrans" available under DG's Advanced Operating System (AOS), the professor continued.

To test the number-crunching capabilities of the language package, Geoghegan converted production runs on economic data from Algol to PL/I. The conversion was easy, he said, and Algol applications which took about 15 minutes on the Eclipse before took only about five minutes in the new environment, "even with moderate competition from other users."

PL/I was originally developed by IBM in the early days of the 360 and stayed very nearly a proprietary language for some time.

Eventually many of the other mainframes implemented versions for their equipment, however, and in 1976 a specification of the language was approved by the American National Standards Institute (Ansi).

DG's PL/I is described as a "streamlined and slightly extended" subset of Ansi's 1976 specifications. In this packaging, the designers omitted high overhead items such as aggregate arithmetic, a spokesman said, but included such niceties as console I/O and the DO case statement out of Algol.

## Three Optimization Levels

Running in interactive or batch mode on Eclipse S/130s, S/230s or C/330s under AOS, the compiler is said to

support interactive program development, English language diagnostics, three levels of optimization during compilation, shared runtime code and access to all operating system functions.

The optimization is a separate optional pass over intermediate output from an early stage of the compilation. It allows the user to choose the degree and type of tuning desired, if any, with each compilation, DG said.

The system can, for example, optimize on expressions and branches and this can help both space and speed, the spokesman said. At another level, the system will also clear out du-

plications of computations which can, he estimated, save 25% of the space used by some programs.

The third level of optimization, in which invariant computations are moved outside of loops, reportedly enhances the speed of the user's program. If all three levels are invoked at once, compilation time would typically be extended 10% to 15%, according to the spokesman.

The term "shared runtime code" as used by DG means the same as the more common phrase "reentrant code": a single copy of a program residing in memory can be accessed concurrently by multiple users.

With the 192K-byte memory required for AOS, an installation can support four to six or eight time-sharing users, especially if they are all working with the same reentrant program. The maximum Eclipse configuration—512K bytes—could support 30 general users or perhaps 60 if the system is dedicated to a function, the spokesman said.

A user's first license for the AOS PL/I package—compiler and runtime libraries—will cost \$4,000. That fee includes installation support, training credit and one year of DG's Software Subscription service, DG said from Rt. 9, Westboro, Mass. 01581.

## Fine-Toothed Comb Used in Jury Search

(Continued from Page 1)

business are "very complex" and therefore the project was unable to come up with a typical juror that might be favorable to Memorex.

### 'Most Difficult Case'

Benora, who has worked on jury selection for such well-known cases as the Attica prison trials and the Joan Little case, said in fact that this was "the most difficult" case she had worked on because people's attitudes and feelings toward business are so complex.

For example, the project found that in general, the people of the San Francisco Bay area were 54.4% pro-Big Business and 41.7% anti-Big Business. IBM, however, was viewed favorably by 69.9% of the people and unfavorably by 28.7%.

On the other hand, the survey found that the majority of the people at least "somewhat agreed" with the statement that the public interest would be served if very large companies were broken up into smaller companies (57.4%), and over 70% felt that very large corporations "do everything possible to eliminate competition."

The data was not only used to try to

develop a profile of a favorable juror but also served to acquaint the Memorex lawyers with prevailing opinions in the area and to help them plan their trial strategy.

While it was difficult to draw a profile of a favorable juror, Benora said the data did give them some pointers to the type of person they wanted. She admitted, however, that the selection process last week often came down to a "gut" feel for the person in spite of all the research.

### Long Trial Expected

For one thing, Benora said the judge was very lenient in letting people excuse themselves from serving on the jury, because the trial is expected to last for up to 10 months.

Because of this, of the 160 people originally called, a pool of only 28 was left to choose from, with the rest excusing themselves because of the long duration of the case, she said.

Furthermore, the judge did not ask

the prospective jurors for much detailed information when he examined them, she said, giving her little to go on in deciding whether the juror would be favorable or unfavorable.

For its part, IBM had an outfit called the Federal Jury Service here prepare a special report on the backgrounds of all 900 people in the jury pool.

Normally, this service sells a book for \$150 to lawyers with public record information on the people in the pool, but IBM had the service update its records for jurors added to the pool after the last book had been published.

For \$675 extra, IBM received such information as voter registration, employment history, assessor's records on property ownership and assessed valuation and records of past jury duty for each of the 900 candidates.

After legal wrangling over access to such information, the service also provided its data to Memorex, which split the fee for the additional work with IBM.

## Michigan Extends Matching

(Continued from Page 7)

Ostahowski argues that the state, which originally had total responsibility for the welfare fraud investigation, should have performed the cross-checking itself rather than delegate the job to a nongovernment organization.

"I don't believe a government agency should deliver what is in essence public information to a private concern," he asserted. "When that happens, the welfare recipients and employees involved are relegated to second-class citizens."

If computer crosschecking of the sort performed in Michigan and elsewhere is left unchecked, Ostahowski warned, the practice could "spread like wildfire" in just a few years. One possible outgrowth of such a development, he speculated, would be a gigantic computer system in which the Federal Bureau of Investigation or some other federal agency could store the serial number of every manufactured good costing more than a set amount.

### Surveillance Possibility

Theoretically, such a data base "could be used to help authorities recover stolen goods," he explained. In practice, however, the same system could be subverted "to maintain a complete inventory of the personal property owned by every person in the country."

Ostahowski does not question the desirability of catching welfare cheats, and he admitted the use of private companies to help detect possible violators of relief laws might not constitute as serious a problem as he fears. But he urged authorities to "take a second look" at the concept of computer cross-checking, which he cautioned could have "astronomical implications" for civil liberties and personal privacy.


"In the end, I suspect the question of whether people's rights are being violated by these investigations will have to be decided by the courts," he predicted.

### Federal Mandate

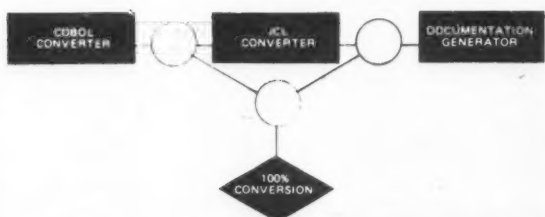
The state Inspector General's Office cites two federal regulations as the legal basis for its use of SSNs in cross-checking welfare records by computer, the spokeswoman here noted.

Regulation 20CFR205.50 empowers the states to use or disclose information about relief recipients when investigating possible welfare abuses.

Federal Regulation 250.11, meanwhile, mandates the states to create procedures for detecting and reporting to police suspected cases of welfare fraud. Failure to establish these procedures could result in a cutoff of federal subsidies to state social services programs.




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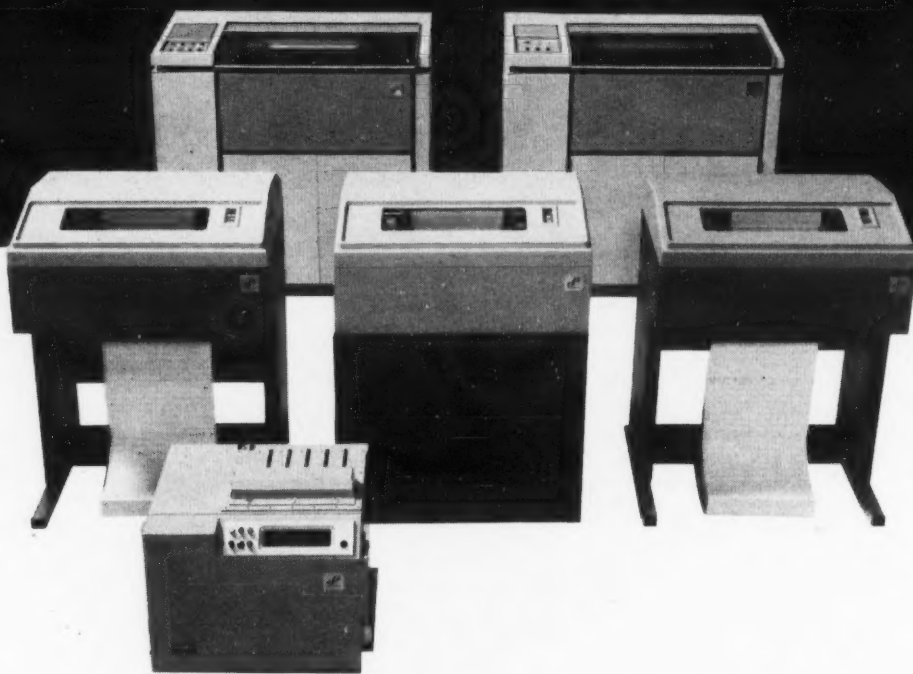
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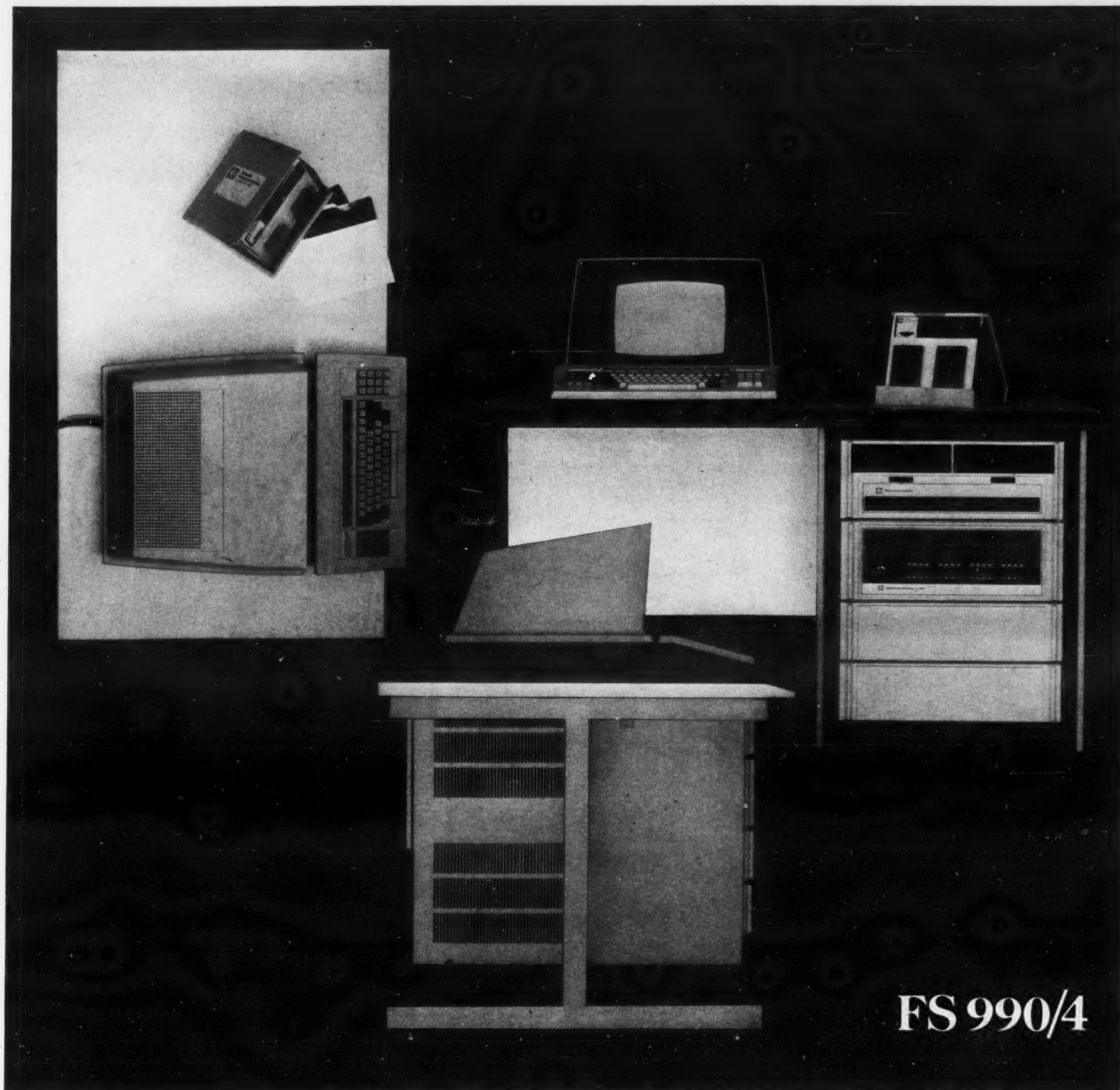
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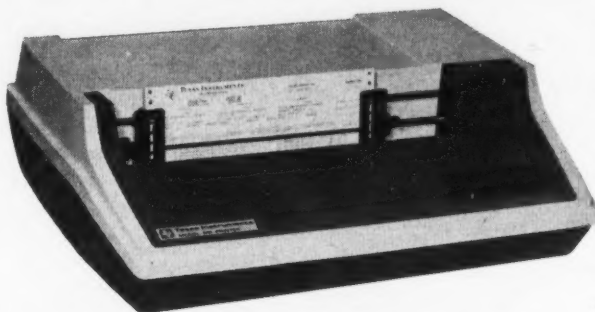
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## Commission Makeup Resolved

# French Reach Accord on DP and Freedom Act

Special to CW

PARIS — In an adjournment eve compromise, both houses of the French parliament approved the Data Processing and Freedom Act [CW, Dec. 12], sending it to President Giscard d'Estaing, whose signature is assured. The national assembly voted a re-

vised text on Dec. 16 and the remaining differences with the senate were ironed out to allow final action on Dec. 22.

As in most compromises, neither the government, Socialists nor the business community got all they were seeking, but each got something.

A little-debated change in the final measure defines personal information as applying to physical persons only, whereas the original version included legal or corporate persons as well. If businesses had access to records pertaining to them held by other businesses, it was felt that

proprietary data might be compromised and the government could monitor private enterprises more closely.

The principal dispute was the size and composition of the National Commission on Data Processing and Freedom, which will be established under the law. The government wanted a 12-member body, essentially composed of present or former judicial officials who, in France, are part of the executive department. The Socialists sought a more independent commission to be nominated by parliament according to the special qualifications of individuals. The senate generally accepted this view.

As a compromise, the government will have its judicial appointments, but the commission will number 17 members and include two deputies in the assembly, two senators and two members qualified in data processing.

The law applies principally to automated records, and most of the provisions of the initial legislation stand although the procedure for organizations to declare their systems of personal records has been somewhat simplified. "Nonautomated data banks," according to the law, or simply manual files, may be brought under its provisions according to the following

conditions:

- When the information is obtained by fraudulent means.
- When people are not informed of the mandatory or voluntary nature of the collection procedure and other rights of individuals.

- When the organization maintaining personal information fails to have sufficient security protections.

- When organizations register information on the political, religious or trade union membership of individuals.

Specifically excluded from the definition of manual files are personal address books.

### Data Obsolescence

Purging old or obsolescent personal information is another key feature of the French law, which takes its lead here from the Germans, who incorporated this idea in their federal data protection law last year. However, instead of placing a maximum age on active files as the Germans did, the French will require all private organizations to specify how long the data will be kept in their declaration requesting permission to maintain personal data system.

Lest anyone take this stipulation lightly, the penalties for violating the law are fines ranging from \$400 to \$400,000 and imprisonment from six months to five years.

## EEC Arm Seeking Privacy Views

By G. Russell Pipe

Special to CW

BRUSSELS — A subcommittee of the European Parliament is seeking public views on how best to protect individual citizens in member countries from abuses that result from computerized recordkeeping and data banks in both the public and private sectors.

The parliament's subcommittee on data processing and the rights of the individual will hear expert testimony on Feb. 6 as part of its role in recommending uniform action that could be taken by the nine countries that make up the European Economic Community (EEC).

The role of the parliament in this issue is to recommend action to the European Commission, which itself has formed a working group to consider the need for an international agreement or convention that would harmonize or make reciprocal the various national laws. The working group of the commission is approaching the issue from a legal and technical position, whereas the parliamentary unit is seeking broader public and political assessment of legislative solutions.

### Experts Being Questioned

A questionnaire has been circulated to a number of experts in Europe as well as the U.S.

The information requested is designed to:

- Determine the principal differences in the approach to legislation on data protection in the European Community, Sweden and the U.S.

- Identify particular difficulties the various forms of legislation may cause industry and individuals.

- Find out if the absence of international legal provisions has already caused difficulties in the application of national privacy legislation.

- Distinguish the scope of "the public sector," seek comments on differences in approach which may be accorded the private sector and learn whether legislation may distort competition.

- Obtain opinions on whether the general principles of fair personal information practice are acceptable and necessary, particularly if adopted at an international level.

- Learn whether the transmission of personal data across national frontiers involves any particular risks.

As for transborder data flows, the questionnaire results may shed new light on whether a binding EEC directive is "urgently required," or whether a directive might obstruct the conclusion of a convention with countries of the Council of Europe and the Organization for Economic Cooperation and Development (OECD).

It might also help determine whether an official body is needed to monitor data protection in the community and what additional costs to data processors would result.

Debates in the parliament since 1974 show wide support for international action in adopting minimum standards for data protection, reducing "unfair competition" in relation to cross border data flows and establishing monitoring systems in those areas where national provisions are not fully effective.

Some also believe that if no unifying action is taken, data havens could be created within or outside the community hampering the Common Market through distortions of competition or obstacles to trade.

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## But Solution on the Way

# Program Error Writes Off SSNs for Tax Office

By Molly Upton  
CW Staff

CHICAGO — Although Social Security numbers (SSN) may be a curse to many people, they are a blessing to taxation departments.

And the Pennsylvania Personal Income Tax Bureau, faced with processing 5.2 million returns whose address labels do not contain the taxpayers' SSNs, may be about to discover just how much of a

boon the preprinted numbers are.

Normally, tax return forms are mailed with a return address label that contains the taxpayer's SSN. The taxpayer affixes the label to his return and the state tax department then enters the number as one of the first steps in processing the return.

In Pennsylvania, however, R.R. Donnelley & Sons Co. prepared a program to prompt

its IBM 370/145 to generate printed labels from a tape sent by the state taxation department. However, the program neglected to require printing of the first line of data, which contained the SSN.

The process of manually going through 5.2 million forms and ferreting out the SSN from attached forms, such as W-2s, is time-consuming at best.

But what a programming error hath wrought, another

program can set right. At least, that's what Donnelley has indicated to the Personal Income Tax bureau.

Using a match code program requiring entry of 21 keystrokes as opposed to 11 on the SSN, 99% accuracy can be obtained in retrieving the correct SSN, according to a Donnelley spokesman.

Donnelley has, in fact, performed a run and isolated the approximately 50,000 cases in which duplications occur in

the match code procedure, he said.

The firm will give the state a list of these persons, and other identifying information on them so the state can differentiate between the duplicates.

If duplicates still remain after running the match code program, the bureau expects it will manually retrieve the SSN from various forms attached to the return, according to David J. Davies, director of the Personal Income Tax Bureau.

The Bureau plans to run two sorts on tax receipts: those with an SSN entered by the taxpayer and those without an SSN, he added.

The bureau anticipates needing some ancillary manual help and relatively few additional keypunch people, Davies said. He plans to run overtime in order to keep up with the bureau's past processing rates.

Donnelley has admitted the error and not only devised the match code program, but also agreed to pay the expenses necessitated by the error, Davies said.

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## Computer May Be Midwife At Contraceptive's Creation

By Ann Dooley  
CW Staff

CHICAGO — Researchers are "impregnating" a computer with fertility facts and folklore in hopes of giving birth to a new kind of contraceptive.

Data from scientific journals and folklore from all over the world are being studied by scientists at the University of Illinois Medical Center here to find new fertility regulating agents in plants.

Scientists believe primitive people limited population growth by using plant extracts; even today, at least 25% of all prescriptions contain principles extracted from plants, according to Dr. Norman Farnsworth, head of the university's Department of Pharmacognosy and Pharmacology.

### Plants Ranked

Using an IBM 370/168, the researchers enter information on more than 5,000 plants that have been determined useful for the project. The characteristics of each plant are weighted in importance and the computer is programmed to deliver a ranked order for the plants according to their likelihood for regulating fertility.

"Folklore information is never-ending," Farnsworth said, and is especially difficult to analyze because it is often vague or ambiguous.

The information is periodically reanalyzed and updated, he said. Those plants that rate highest usually are mentioned in folklore as well as used in studies on animals or by humans, Farnsworth added.

### Weighting System

Some of the factors included in the weighting system are adverse side effects in humans or animals, whether the plant is poisonous, its scientific name, the part of the plant used and the length of time used. Several hundred variables were entered into the sys-

tem, according to Farnsworth.

Extensive crosschecking for accuracy and duplication occurs before and after the data is entered into the computer, he noted.

Once researchers have analyzed the computerized plant list, they will select a limited number of plants for further study.

The researcher's goal is to discover an alternative to current contraceptives, such as a safe morning-after pill, male contraceptive or a contraceptive to be used before intercourse or after missing one menstrual period.

Since a new kind of contraceptive is the object of the search, the computer has been programmed to exclude any plant that would act similarly to the present birth control pill.

The project, which was conceived by the World Health Organization, is also funding centers in London, Brazil, Hong Kong, South Korea and Ceylon where the selected plants will be tested.

## Calendar

Feb. 27-March 1, Cherry Hill, N.J. — **Data Entry Management and Supervision Seminar**, sponsored by Management Information Corp. Contact: Management Information Corp., 140 Barclay Center, Cherry Hill, N.J. 08034.

Feb. 27-March 1, Philadelphia — **1978 Business and Personal Computer Sale & Exposition**. Contact: George Pachter, Produx 2000, Roosevelt Blvd., Mascher St., Philadelphia, Pa. 19120.

Feb. 27-March 2, San Francisco — **Compcon 78, Computer Technology: Status, Limits, Alternatives**. Contact: Institute of Electrical and Electronics Engineers, P.O. Box 639, Silver Spring, Md. 20901.

## Call for Papers

CONVENTION INFORMATIQUE 78, Palais des Congres, Porte Maillot, Sept. 18-22, 1978.

The theme of the convention is "The Insertion of Data Processing, a Key to Success." Questions will include "What are the problems of the integration of data processing into organizations and companies?" and "What parameters can be taken into account in the designing of information systems which will be used in different phases of future project?" Paper topics include new technologies, user groups, tools, techniques and services.

Four copies of an abstract of at least 500 words, in English or French, should be sent by Feb. 15 to Convention Informatique, Secretariat, 6, Place de Valois, 75001 Paris, France.

THIRD INTERNATIONAL SYMPOSIUM ON ULTRASONIC IMAGING AND TISSUE CHARACTERIZATION, National Bureau of Standards, Gaithersburg, Md., June 5-7, 1978.

Focus will be on the state of the art, new directions of technology and research opportunities in the noninvasive characterization of the ultrasonic properties of tissue. Topics include techniques for measurement of ultrasonic parameters, computerized tomography, signal processing and pattern recognition, microscopy and standards and calibration methods.

An 800-word abstract should be sent by March 1 to Dr. Marvin Linzer, Materials Building, Room A329, National Bureau of Standards, Washington, D.C. 20234.

1978 INTERNATIONAL CONFERENCE ON PARALLEL PROCESSING, Bellare, Mich., Aug. 22-25, 1978.

Papers are requested describing recent advances in all aspects of parallel/distributed processing. Topics include processor-memory interconnections, reliability and diagnostics, performance measurements, languages and application studies.

Both regular and short papers will be accepted. For a regular paper, submit a 100-word abstract and a 1,000-word summary (submission of the full text in lieu of the summary is encouraged); for the short paper, submit four copies of a 100-word abstract and a 300- to 500-word summary. Send before March 15 to Prof. G.J. Lipovski, Department of Electrical Engineering, University of Texas, Austin, Texas 78712.

FIRST INTERNATIONAL SYMPOSIUM ON ULTRASONIC MATERIALS CHARACTERIZATION, National Bureau of Standards, Gaithersburg, Md., June 7-9, 1978.

This will be the first meeting devoted exclusively to fundamental measurement methods that offer potential for the practical assessment of material performance. Topics include ultrasonic methods for determination and verification of material properties by measurements such as velocity, attenuation, absorption and scattering; and new ultrasonic instrumentation, transducer developments and approaches to standards for calibration. Theoretical and experimental papers are requested.

A 300-word summary should be sent by March 15 to Harold Berger, Materials Building, Room A363, National Bureau of Standards, Washington, D.C. 20234.

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## But Could Save Billions Planners Warned Office Automation Not Easy

ORLANDO, Fla. — Automated office systems will boost business productivity and cut costs only if their installation is preceded by careful planning and evaluation, according to Harvey Poppel, a senior vice-president of Booz, Allen & Hamilton in New York City.

Although he predicted that automation will trim much of

the \$600 billion that business spends annually for office operations, Poppel noted that knowledge of how offices work and how they should be changed remains limited.

"We must expand our knowledge of office operations and condition our organizations to the changes which inevitably occur" in electronic office systems, he

said in a keynote address at a recent International Communications Association meeting here.

Speaking at a seminar on "Telecommunications and the Office of the Future," Poppel presented a methodology for planning systems. It begins with systems selection, which stresses the identification of users and of the sources and

flow of information through the organization.

The next planning cell, systems architecture, addresses a number of critical issues: How important is retention of information? What provisions should be made for confidentiality? How will the planners implement new systems without disrupting existing ones? How will new types of infor-

mation be indexed and processed?

"People using these machines need contact with other people — they need to talk to each other and they need to be managed," Poppel said. He underscored the importance of selecting the right systems to fit the styles of individual users and of preparing these users for less face-to-face communications and more indirect communications from workstations.

In reviewing planning issues, Poppel noted problems in financing and implementation of technical systems. "Who is going to pay the staggering development costs? Hundreds of users, each with his own ax to grind, or the 'corporate' group?"

### Biggest Hurdle

But "the behavioral element is the hurdle we think most likely to trip you," Poppel said. "A negative user reaction may be triggered by poor systems design. Most people will respond favorably to an electronic office environment if it is flexible and adaptable to their own style of work — that's the challenge in systems planning."

Predicting impending breakthroughs in word and image processing, communications processing and office data processing technology, Poppel added, "The real potential for electronic office automation is the evolution and acceptance of electronic mail, intra- and interorganizational networks, smart PBXs, video conferencing, business-home networks and common data bases."

The critical factor in building electronic offices is the evolution of simplified packages of electronic systems and the marriage of these components into interactive workstations, Poppel said.

He cited three emerging applications for such systems: generalized event-driven interactive workstations, specialized interactively driven stations and highly specialized procedure-driven stations used by support staff for the major portion of their work functions.

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# Library Retrieval System Taps 80 Data Bases

By Tim Scannell  
CW Staff

CORVALLIS, Ore. — A person who knows what he's looking for can access the resources of more than 80 data bases with help from an operator and a computer terminal here at the University of Oregon's library.

The Library Information Retrieval Service can, for a fee, access files containing bibliographical information on a variety of topics in the sciences, business, economics and world politics, according to a library spokesman. These files are maintained by six information organizations, including the New York Times Information Bank.

A person desiring to research a subject would come to the library and describe the area he would like searched to one of the terminal operators. "We do all of the searching ourselves; a patron can't come in and use our terminals," Kris Brooks said. Brooks is coordinator of the system and one of two persons who operate it at the request of users.

"When a person comes in with a topic, we try to determine what it is he really wants and if a computer search is really appropriate," she said. "I had a patron come in and request some information on the planning field, but unfortunately it's a very nebulous area; there is not really any kind of control over the literature. I told him that I really didn't think I could do anything for him."

On the other hand, many people who have used the service have found it worthwhile. "We did one project that retrieved over 1,000 references and will result in a major research project and about three dissertations," Brooks recalled.

## Average Cost \$18

Costs for using the system vary from 32 cents for a short research project to as much as \$1,500 for large ones, the spokesman said. Approximately 1,800 persons have utilized the service with searches averaging about \$18.

The informational data banks are accessed through 300- and 1,200 bit/sec terminals. The library is billed according to the time spent communicating with a particular computer.

Brooks said two problems have been encountered in managing such a system: finding a document once it has been listed and explaining the computer's limitations to the users.

The first problem involves customers who complain about the length of time it takes to locate referenced material. "My job right now is to identify if something has or has not been written and, unfortunately for patrons, it is not actually to locate the original docu-

ments," Brooks said.

"That is a very frustrating process at times. We find now that we can, in a very few minutes, locate all of these marvelous references and it may take people three or four months to get the original documents," she added.

Document delivery hasn't been developed yet because so much time has been spent in discovering "what can be done with the searching procedure itself," Brooks said.

But, she noted, "it's not going to do people a whole lot of good if they learn this absolutely fantastic thing exists" and then find out that they can't get the information.

The library service, in cooperation with the U.S. Department of Labor, is currently experimenting with a solu-

tion to this problem in one research area by trying to set up its own data base. Using Control Data Corp. equipment, the library is attempting to create a reference file, including documentation, on the employment training field.

The second problem is trying to convince people that the terminal is only a machine, not an electronic wizard. "People look at the 1,200 bit/sec terminal and think it's really a 'magic machine.'" Things are printed out so quickly and everybody's fascinated by it and somehow feel ... it has to have the answer to their questions," she said.

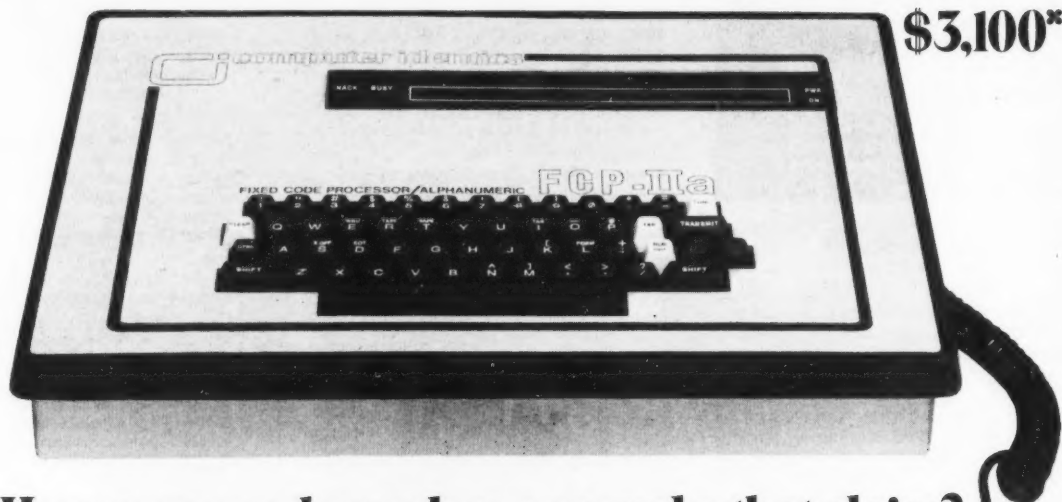
The Library Information Retrieval Service isn't unique; there are quite a few computerized libraries set up

around the country. The motives of other similar organizations, however, may involve more than just supplying information to interested users, Brooks said.

"I begin to wonder about the kind of services being provided and whether they really know how to ask the proper questions of their patrons and get the appropriate answers," she explained. "It doesn't take very much to start a business ... All you have to do is sign an open contract and promise to pay your bills ... buy your terminal ... and you're in business."

Some private concerns going into business, she contended, look at it just as a profitable venture. "We are not here to make money, so our primary concern is our patrons," she said.

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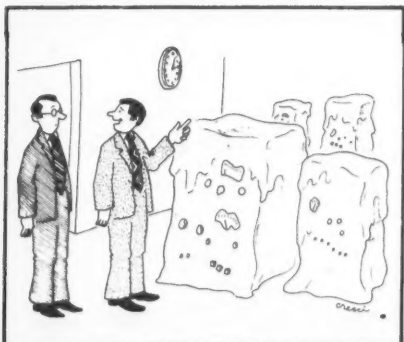
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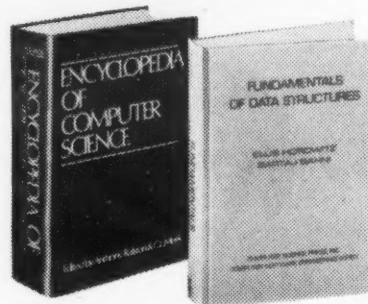
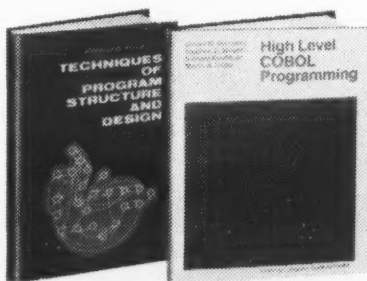
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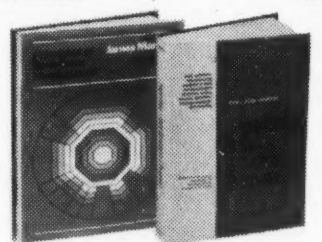
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## Software Written In-House

# Hospital Credits System for Saving \$1 Million

By Brad Schultz  
CW Staff

CLEVELAND — "It does everything but kiss us good night and tuck us in" and saved about \$1 million over the past year.

So said a spokesman for University Hospital here in describing a computer system that performs 32 separate operational functions for the institution. The system assists meal preparation, admissions, schedules surgery, evaluates laboratory results, aids property control and does accounting and many other tasks for the 981-bed facility, the spokesman said.

### High Utilization

"We are high in computer utilization, yet our costs are not correspondingly high; in fact, they are at a lower level," he said, comparing University Hospital to the national average.

Using 1976 figures, the hospital ranks higher than 90% of the nation's hospitals in computer usage, but its operating cost adjusted for outpatient activity is at the national median for large teaching hospitals, the spokesman noted.

## DP Expo Slated At Month's End In Washington

WASHINGTON, D.C. — A DP exposition featuring a demonstration of new products, applications and services by more than 150 firms will take place at the Sheraton-Park Hotel here Jan. 31-Feb. 2.

Federal DP Expo '78, a three-day conference, will include 40 exhibitor-sponsored application workshops and nine professional seminar sessions. Among the topics to be discussed will be personal computing, computer graphics, microcomputers' impact on electronics funds transfer and the law vs. the computer.

Admission to the exposition, workshops and seminars is free. Additional information and a copy of the program can be obtained from Ted Evans, Federal DP Expo '78, 11501 Huff Court, Kensington, Md. 20795.

## Ginsburg Named To Jones Chair

LOS ANGELES — Dr. Seymour Ginsburg, a pioneer in theoretical computer science, has been appointed the first Fletcher Jones professor of computer science at the University of Southern California School of Engineering.

Ginsburg is a professor of computer science at the university. His early work in the areas of switching theory, automata theory and context-free computer language were basic contributions to computer science.

The Fletcher Jones Chair, named in honor of the late founder and chairman of the board of Computer Sciences Corp., was recently created by a grant of \$1 million from The Jones Foundation.

The meal preparation program — planning menus and printing recipes — alone saved the hospital about \$1 million over the past five years, he said. The system helps organize 6,000 meals per day and holds a data base of more than 1,000 recipes.

The admissions processing segment of the system "contains admitting and socioeconomic data on more than 170,000 patients admitted here at University Hospital since 1970," he said.

The surgery scheduling program handles 75 to 100 procedures daily, and another program was used to evaluate results of 2.1 million laboratory tests last year, according to the

spokesman.

The hospital saves about \$222,000 annually through computerization of accounts payable and patient census taking, he added.

The key to the system's success is its in-house-developed specialty software, Director of Information Systems Palani Palaniappan indicated. Palaniappan's staff has developed all the application programs featured in the system, writing them in Cobol.

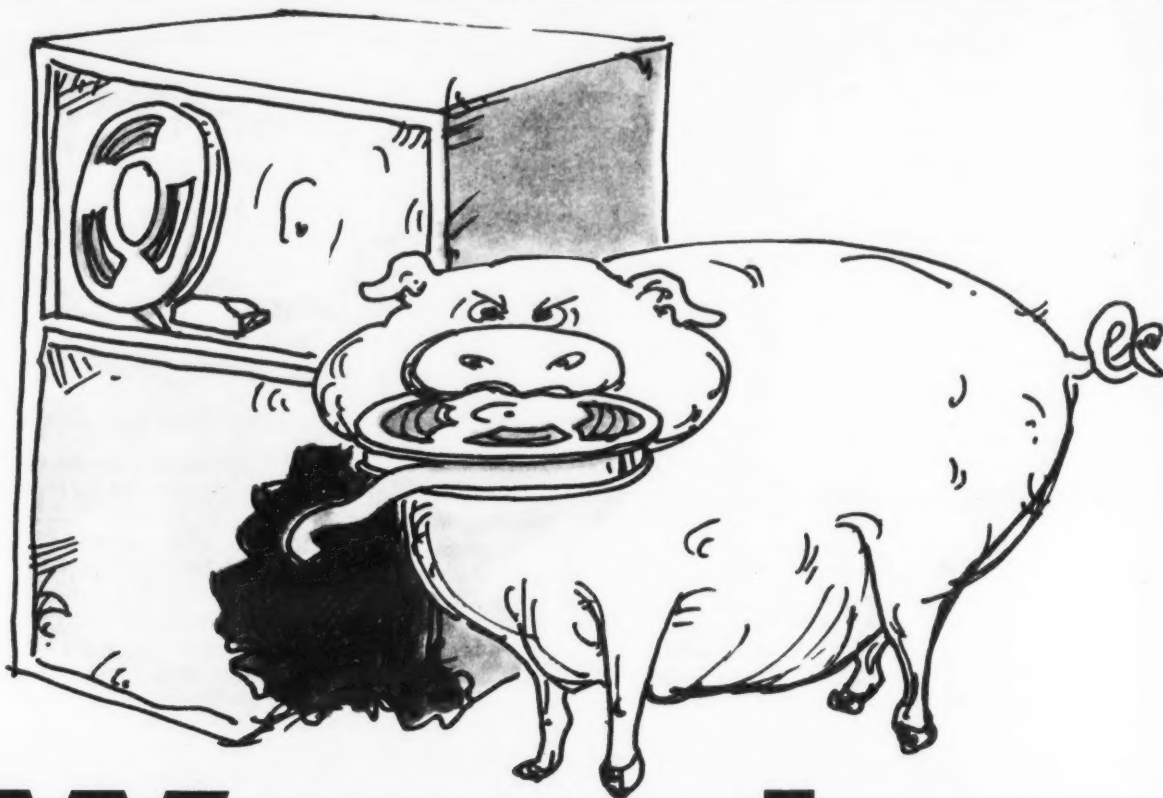
The system is based on an IBM 370/158 CPU and supports the programs with IBM's Customer Information Control System (CICS). The hospital saves about \$250,000 annually by leasing its hardware from a third party

rather than from the manufacturer, Palaniappan said.

Intel Corp. is the third party, receiving monthly lease payments of \$28,000 to \$30,000; the manufacturer would charge \$55,000 to \$60,000, he added.

"IBM does not lease on a long-term basis; the maximum lease it offers is four years ... Intel gives you a longer lease and the benefit of lower lease payments," Palaniappan said.

Palaniappan acknowledged that the system yields a normal crop of bugs and malfunctions, but seemed pleased with its overall impact. "We have gotten to the point where it is difficult to conceive of how we would operate without the thing working," he said.



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# Editorial

## Think, Mainframers . . .

The new Datapro Research Corp. listing of how users rate the mainframe vendors (see Page 1) should give those manufacturers pause.

Just think: The vendor with the highest overall satisfaction among its users was Xerox Corp., which has been out of the business for over a year. And in second place was Amdahl Corp., which has been marketing systems for less than two full years.

The only other firm to receive better than average ratings from its users was Digital Equipment Corp., which is far better known in the minicomputer area than for its medium to large mainframes.

Control Data Corp., IBM, NCR Corp., and Univac all ended up with average ratings, while Burroughs Corp. and Honeywell Information Systems, Inc. were below

the average in overall satisfaction ratings.

The good news from all this is that no vendor — with the exception of HIS — was rated as less than "good" by its users, since the average scores were just above that level of satisfaction.

The bad news, of course, is that users apparently do not rank the traditional mainframes high on their satisfaction lists.

Clearly, there is room for improvement on the part of all vendors in the business. The Datapro breakdown shows specific areas in which users rate their vendors highest and where those vendors experience problems. We hope manufacturers will now attempt to improve in those areas of weakness.

## . . . And Think Again

And while users were rating the traditional mainframe vendors as little more — or a little less — than average, a whole revolution in prices has taken place in the computer industry over the past year.

The industry has become more competitive — which means lower prices for users and a wider selection at those prices.

IBM traditionally had been the higher priced alternative and has still managed to pile up 65% share of the computer marketplace, thanks at least in part to an excellent marketing team and after-the-sale support.

But after the price cutting of 1977, IBM is now clearly in the middle

or lower end of the marketplace on a price and performance basis.

These two facts may spell trouble for the other traditional mainframe vendors in the future. From the Datapro survey it seems clear that their users are no more — and in the case of HIS and Burroughs less — satisfied than IBM customers. And now the IBM alternative does not cost any more.

Therefore, the other vendors in the business need to start offering their users either better service than in the past, or they may be overwhelmed by the IBM marketing juggernaut.

It is time for all the vendors in the business to rethink their strategies.

## Data Past

### Five Years Ago Jan. 24, 1973

MINNEAPOLIS — One of the oldest of the antitrust suits against IBM ended here when Control Data Corp. accepted an out-of-court settlement and in effect handed the broader issues raised by the case to the Justice Department for resolution. In total, CDC may have received as much as \$146 million in either direct cash outlays or in promises of future business from IBM. In turn, CDC had to put up \$16 million in cash to buy the Service Bureau Corp., an IBM subsidiary.

WELLESLEY, Mass. — Honeywell Information Systems, Inc. introduced the Multiplexed Information and Computing Service system (Multics) as a commercial product this week. Multics included security features and the user could write his own operating system commands.

### Eight Years Ago Jan. 28, 1970

GAITHERSBURG, Md. — An official of the National Bureau of Standards (NBS) called for the establishment of a "giant membership society" modeled after the British group and, similarly, called the American Computing Society. Dr. H.R.J. Grosch, director of the NBS computer center here, said the American Federation of Information Processing Societies should be consolidated with all outlying societies to form a more powerful and affluent organization.

BOSTON — A franchised computer school, the Institute of Computer Technology (ICT), quietly closed up shop on Jan. 16 — so quietly that its students weren't aware of the school's demise until they received notice in the following day's mail that "financial difficulties" had forced the closing.



"There's Good News — and Good News!"

## Letters to the Editor

### The Coast May Not Be Clear

There was a very dangerous omission in "Air Force Picks Halon With Workers in Mind" [CW, Dec. 26-Jan. 2]. The article failed to stress that an electrical fire involving coaxial cabling, which is very common in computer rooms, can be deadly to workers. Never mind the Halon system, polyvinyl chloride (PVC) fumes from coaxial cable combustion are lethal.

Those who read the article could be misled if they believe they can immediately return to an area where PVC fumes have been released by a fire. I quote: "... personnel can reenter the area where a fire has occurred and resume operations immediately." (This refers, of course, to the effects of Halon but doesn't mention the PVC danger.)

Halon or no Halon, only fire officials can instruct personnel when it is safe to return to the site of a fire.

Tony Fernandez  
N. Bergen, N.J.

### IBM Activities in India

"IBM Exit From India Not Surprising" [CW, Jan. 9] was wrong on two points. The first was the implication that IBM may have paid bribes in India and the second was that we withheld new technology in order to generate profits from older equipment.

IBM's policy regarding bribes, payoffs or any other form of questionable payments is quite clear: We just don't do it. Numerous audits of our operations in India, conducted both by us and our outside accounting firm, have never revealed any use of IBM funds for such purposes.

As for withholding technology,

you should know that we have made many attempts in India over the years to market our current products incorporating the latest technology. Almost without exception, customers were unable to obtain government permission to install our System/360 and System/370 machines. At no time did we "refuse to import newer computers."

Furthermore, our proposals to the Indian government included an offer to manufacture current technology products at our Bombay plant. The government did not accept this proposal.

Ralph A. Pfeiffer Jr.  
Chairman

IBM World Trade Americas/  
Far East Corp.  
N. Tarrytown, N.Y.

### UN, ACM Can't Be Compared

I would like to point out to letter-writer H.R. Sides that comparing the United Nations to the Association for Computing Machinery (ACM) [CW, Jan. 9] was itself illogical and nonsensical.

The UN exists to discuss and iron out political and ideological differences between the nations of the world, while the ACM is an organization of professional men and women interested in advancing the knowledge of computing machinery. In response to the Soviet Union's refusal to allow some citizens to participate in ACM conferences, the ACM acted in a very logical manner by banning the Soviet Union from participation.

It is common for people to be deprived of their rights in the Soviet Union. The ACM should be very proud of its humanistic stand and should be congratulated by both its DP professionals and laymen.

Russell A. Hersch  
Chevy Chase, Md.



# DP Crooks Couple Basic Skills, Craftiness

By Jack Stone  
Special to CW

Although the typical computer thief generally uses only a basic set of DP skills and knowledge, researchers are thoroughly impressed with the craftiness and diversity of his misdeeds.

In a two-part series on computer crime in *The New Yorker* [Aug. 22, 29], Thomas Whiteside wrote a compelling account of computer crime, with particularly chilling commentary on mischief perpetrated by devious DP employees. (The series is a mandatory reading assignment for all DP managers and supervisors.) Much of the material in this column was extracted from the series.

Why are computer crimes committed, usually by seemingly loyal and honest employees? One reason is that the opportunities for these illegal acts are legion. People who, under nearly all other conditions, would be law-abiding citizens are easily enticed.

Further, these opportunities are indirectly supported by the fact that so many users (including chief executives, auditors and security officers) neglect giving proper attention to the DP operation.

Perhaps it's the impersonality of the computer which develops feelings of intimidation or maybe it's the machine mystique, but the net

result is that most unknowledgeable users take computer-generated listings as fact. They seem to have a deep, abiding faith in these artifacts, a trust they would rarely place in the humanoid worker.

Computer crime also provides what seems to be a neat and tidy intellectual and ethical environment for the DP evildoer. It provides a wonderful technical challenge; the loss is difficult to detect; and it's not like really sticking one's hand in the till (although the net take can be vastly larger).

Then there is employee vengeance aimed directly at management for feelings of being overworked, underpaid or unfairly treated. One overworked operator, an employee of a trucking firm, took home and destroyed some billing data — \$2 million worth; he had not been given enough time to enter it. An irate insurance company tape operator, after being fired for misbehavior, erased, misfiled or mislabeled vital tapes — including their masters — just before her departure. It cost about \$10 million to re-create the data sets.

Unhappy programmers trying to get even with the boss turn to more sophisticated ventures. A programmer in France who was fired reset volume labels to expire two years after his departure; his scheme was successful.

Other programmers, whiling away the time until dismissal, are known to have reprogrammed financial applications to receive a handsome severance settlement or substantial retirement pay.

Free computer time and data set access are other targets of wayward employees:

- Three operators working for a

## The Human Connection

major book publisher ganged together to steal the company's customer list and sold nearly three million names. The list itself was worth \$1 million.

- A computer operator employed at a state driver's registration bureau spirited away the name and address file after being bribed by commercial direct mail interests.

- A police officer was indicted by a federal grand jury for reprogramming an FBI information system to obtain data for outside merchandising.

Even ex-employees get into the act; in one case an ex-employee of a commercial service bureau was charged with grand theft for allegedly using terminal passwords to

steal machine time for his new employer.

Finally, without really intending to induce nightmares, I want to relate the curious case of the terminal-based embezzler who lifted nearly \$1.5 million from his banking employer during his four-year career.

In Whiteside's words, "However much management may have come to rely on these super-efficient DP systems, the systems inevitably contain certain imperfections, and it is the knowledge of these imperfections which can bring a gleam of temptation to the eye of a supposedly trustworthy bank employee — especially one who happens to feel that he has been treated unfairly by management ...

"Through a computer terminal he was authorized to use, he modified bank records so that customers who conducted transactions thought they had money in their accounts which they didn't have (and he pocketed the difference) ...

"For all his ability to conceal his computer-terminal fraud ... he had had no training at all in computer science ... and no special knowledge of the internal circuitry or of programming the computer."

Stone takes a look at some common misconceptions about computer crime next week.

# Confusion Cited in Chase Service Marketing

About a month ago, I discussed the checking account overdraft protection system known as the "English overdraft" method, which is used by Chase Manhattan Bank [CW, Dec. 19]. With this system, Chase lends an overdrawn customer the exact amount of money he needs for the time he needs it.

In contrast, most banks set up a special installment loan account and, in multiples of \$50 or \$100, sell the overdrawn customer the maximum possible loan; the loan is repaid over a fairly long period.

From the customer's point of view, the English method seems to be the better one because it results in smaller interest charges.

However, Chase's service is not selling well, and I asked readers, "How do you think you would market this real overdraft protection in competition with the installment loan selling gambit sold under the cover of overdraft protection?"

The answers I received showed an unusual depth of knowledge. They came from people who used the Chase system 14 years ago, people who had not used the system but had seen other computer advantages lost in the marketplace and people who were just interested.

Despite the difference in back-

grounds, there seemed to be a consensus: Chase had not really marketed the system at all because it had allowed it to be confused with the standard installment loan system.

## Marketing Confusion

According to readers' letters, there are three areas where this confusion is apparent: in the name of the system, in the discontinuation of the old system and in the use of old system methods on statements.

The system is called an "overdraft protection system." This does not distinguish it from other systems with the same name, even though it is described as being a better one. An adjective such as "exact" ("exact overdraft system") would make that distinction and point to the system's advantages.

Even better would be a totally different name, perhaps "Computer-Accurate Protection System," "Minimum-Loan Protection System" or "Minimum-Interest-Days System." These would also make the system's advantages readily apparent.

Merely replacing an old service with a more efficient one doesn't mean instant marketability because it does not underline the differences between the two.

In this case, there is no reason why Chase should not have continued to sell installment loans triggered by overdrafts; had it done so, customers would have been forced to make a choice — and to note the benefits of the new system.

Chase's final error seems to be the use of old system methods on statements (note the sample, which Chase made up for me). The problem is that a separate transaction is entered every time the amount of overdraft changes. This makes the whole thing seem confusing, when it is actually very simple.

Another way to simplify the statement would be to print out the accurate balance, even if it is in overdraft, and use the term "Average

Daily Overdraft" instead of "Average Daily Balance" at the bottom.

All of this applies to many areas in Computerdom. Our methods will not be bought by the public unless they are offered as alternatives and unless their advantages are underlined.

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The  
Taylor  
Report  
By  
Alan  
Taylor  
CDP

One-Statement Banking

JOHN JONES

SAMPLE

CHASE

Checking Account Summary				As Of			
Previous Balance	As Of	Checks	Other Debits	Deposits - Other Credits	As Of	New Balance	
200.00	2/29	7	787.81	2	925.00	3/31 336.12	

Checking Account/Cash Reserve Transactions			
Date	Amount	Description	Daily Balance
121 3/2	122.51	CASH RESERVE LOAN	3/2 77.49
122 3/4	250.00		3/4 172.51 3/4 172.51RI
124 3/8	116.12	CASH RESERVE LOAN	3/8 288.63RI
			3/8 116.12
125 3/20	75.00	** DEPOSIT/CASH RESERVE PAYMENT	3/15 211.37
126 3/24	22.50		3/15 500.00 3/24 87.81RI
127 3/24	90.53		(288.63) 3/30 337.19
128 3/24	111.15	CASH RESERVE LOAN	3/31 336.12
			3/24 87.81
3/31	1.07FC	** DEPOSIT/CASH RESERVE PAYMENT	
			3/30 425.00 (87.81)

Cash Reserve Summary		Credit Line		Unused Credit Line	
Previous Balance As Of	Total Cash Reserve Credits	Previous Balance As Of	Total Cash Reserve Debits	Previous Balance As Of	Total Cash Reserve Debits
2/29 0	376.44	2/29 0	376.44	2/29 0	376.44

Annual Percentage Rate 12%  
Daily Periodic Rate .0329

The Finance Charge on Cash Reserve Loans continues to accrue until the date of payment.

Send written request concerning the cash reserve portion of this statement to The Chase Manhattan Bank, P.O. Box 111, Station 60, New York, N.Y. 10038. Credit statements received concerning the cash reserve portion of this statement to the branch telephone number printed above.

To obtain credit to your account as of the date we receive a cash reserve payment, the payment must be made at a branch of this bank prior to 7 P.M. on 1st, 3rd, 5th, 7th, 9th, 11th, 13th, 15th, 17th, 19th, 21st, 23rd, 25th, 27th, 29th, and 31st. Credit may be delayed up to 5 days if you pay after that time or at any other location.

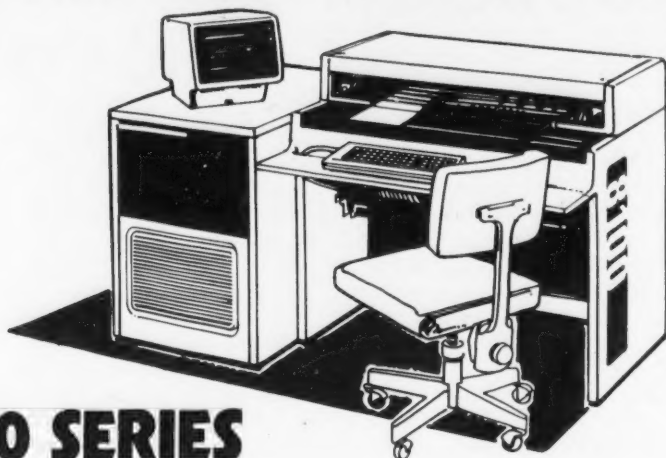
Notes: See reverse side and accompanying statement(s) for important information.

Sample of Chase Statement



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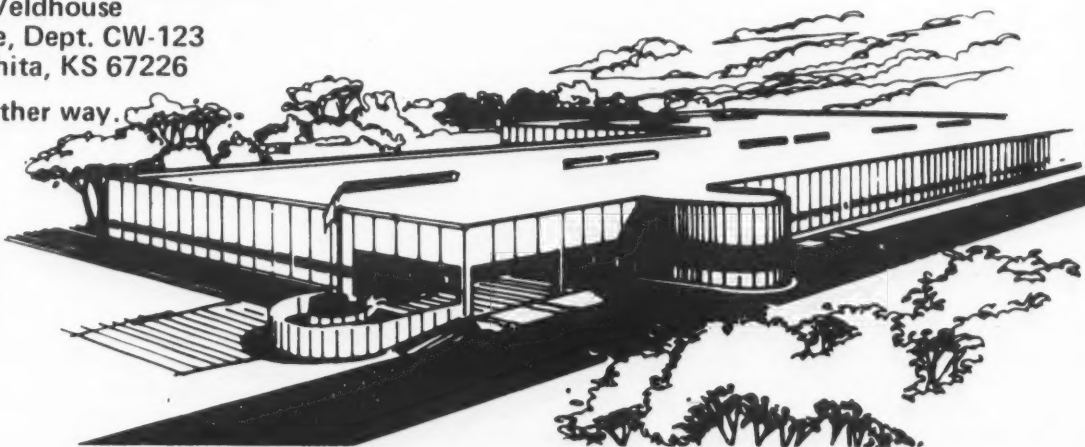
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# Package Helps Designer Visualize Ideas

By Brad Schultz  
CW Staff

ELMSFORD, N.Y. — Shaded pictures of three-dimensional objects, created from mathematical descriptions of the objects, can be shown on a CRT screen — and then twisted and turned so the objects can be viewed from new perspectives — with a software system called Synthavision.

Synthavision lets users generate a 3-D mathematical model, slice through it at any point from any angle and produce line drawings of any cross section needed, according to Mathematical Applications Group, Inc. (Magi) vice-president Leon Malin.

Magi developed the process primarily for such design-and-production applications as engineering analysis and numerical control, building it from a set of proprietary Fortran programs.

The initial step in using Synthavision is always modeling the part to be depicted or analyzed — a technique based on the notion that most solid structures, no matter how complex, can be broken down into simpler shapes, Malin said.

He noted that nearly any 3-D object can be formed of such geometric "primitives" as spheres, cones and boxes; and that the process currently uses 11 primitives, with more being contemplated.

## Quick Results

Malin indicated that Synthavision differs from conventional computer-aided design systems in being able to quickly and economically produce 3-D shapes — "we've produced results in three or four minutes." It excels in producing any view desired — either as a line or shaded drawing, or as numerical data, he added.

Synthavision can create a geometric model for engineering analysis applications that determines volume, weight, center of gravity and other physical properties and provides data for

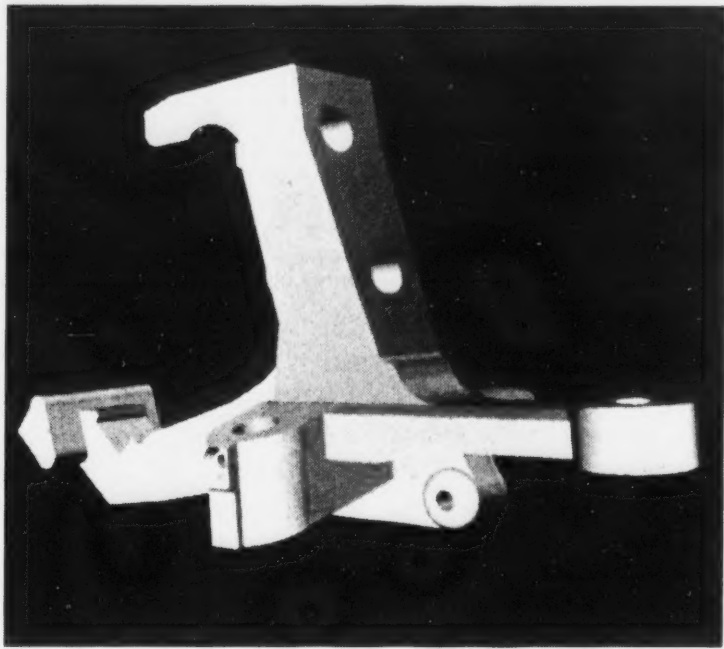
stress-analysis codes, Malin said.

For numerical control applications, the process can provide 3-D input typically used in program checkout before engagement of the cutting tool, he said.

Synthavision can facilitate manufacturing operations by offering views of new, nonexistent components before they have left the drawing board, Malin noted, adding that in this way costly preproduction errors can be minimized.

Synthavision can be used on almost any CPU that has 220K bytes of available memory, a CRT output device and support for Fortran.

The package costs about \$150,000, depending on options, Malin added from Magi headquarters at 3 Westchester Plaza, Elmsford, N.Y. 10523.



# VCI Enhances OS Scheduling

By Don Leavitt  
CW Staff

CHERRY HILL, N.J. — Installations working under IBM's OS or OS/VS can schedule workloads dynamically with help from a trio of products now available from Value Computing, Inc. (VCI), a vendor spokesman claimed.

The software support can start with either VCI's System III scheduler for a single CPU or the Data Center Scheduling System. To either base the user must add the Stars on-line job-tracking system [CW, Sept. 10] and the just-announced Apollo JCL submission subsystem, he said.

System III is a CPU or machine scheduler that balances resource demands, time constraints and resource availability to generate the best job mix for a shift or a day in advance. The Data Center scheduler extends that concept to produce schedules for the CPUs and all other work centers within the center, he explained.

Stars — more formally, the Status Tracking and Revision System — allows an installation's operators to follow the progress of jobs through their systems and to make changes, as the need arises, for work that is already underway.

Apollo is an on-line JCL and control card submission subsystem that uses as its inputs the schedules developed by the scheduling systems or revisions to those schedules entered by the operations staff. Apollo retrieves the appropriate JCL from the user's procedure library and submits it in schedule sequence to the operating system.

## System Adjuncts

Both Stars and Apollo were designed from the start as adjuncts to the batch-oriented scheduling systems. They were never seriously envisioned as stand-alone products, the spokesman said, noting that therefore, the coding in each was specific to its task

without generalization.

The benefits specific to Apollo include a sense of assurance that all production JCL is under control of a single system that can be constantly audited and improved without adding people, the spokesman said. The subsystem also provides an audit trail of all JCL changes made and supports better restart procedures, he added.

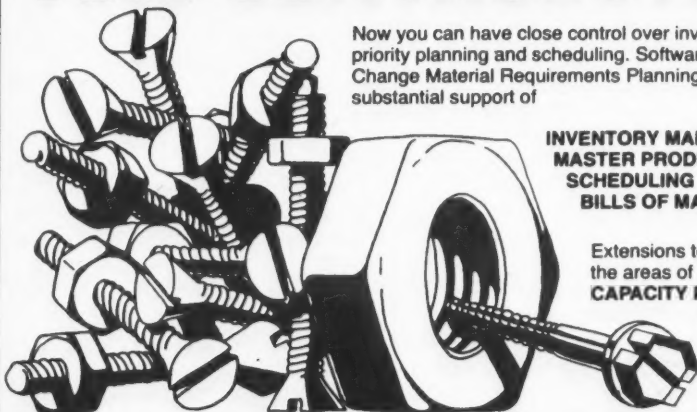
One of Apollo's strong points, according to VCI, is the software's lack of dependence on any part of IBM's operating system or any of the Selectable Units into which IBM is now subsetting the operating system.

The complete scheduling system costs \$16,000 (for System III) or \$24,000 (for the Data Center version); plus \$6,000-\$10,000 for Stars; and \$10,000 for Apollo.

All the software is available now, VCI said from 300 VCI Building, W. Marlton Pike, Cherry Hill, N.J. 08002.

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## Creativity Seen Vital Factor, Even in Maintenance Work

By Robert R. Jones  
Special to CW

There has been a lot said and written about the functions of effective organizations when designing and implementing a system. The approaches, pitfalls, rewards, successes and failures have all had some attention paid to them.

Notice that I did not say all have been identified; if every possible pitfall could be identified, the role and functions of a design group could well be eliminated.

There have been many courses offered and conferences held with the goal of refining the art of systems analysis in general. More specific attention has been paid to designing and implementing systems or applications.

Analyst and programming skills have been sharpened as a result of all this effort. The product of all this concern is an efficient, well-planned, successfully running, neatly documented,

user satisfied *easily maintainable* system. But, invariably, the best of plans often miss the target.

### Maintenance Group

At any rate, changes or fixes of some sort are going to be required in almost every system delivered. This is no surprise and is also a very crucial part of the system. The responsibility of making the necessary changes is often referred to as "maintenance."

In many shops, the maintenance group is responsible not only for correcting errors, but also for adding enhancements. It is often difficult to get good people to want to work in a maintenance group. This may be because the thought prevails that there is a lack of creativity which may be exercised on the part of the programmer/analyst working in the maintenance group.

The fact that the programmer/analyst has to "straighten out somebody else's mess" is the cry most often heard coming from the maintenance group.

The good systems analyst or programmer has an especially difficult task in finding a meaningful relationship between his creative talents and his role in a maintenance group. When attempting to solve problems in a system, he feels all creative talents he has acquired are put aside, and he sees himself functioning strictly as a program investigator.

It is uncommon for him to view this role of investigator as requiring creative talents. In actual fact, however, if he would take the time to evaluate what in fact his steps and his approaches were, he would often times find in solving a particular problem that most of what he considers creative

(Continued on Page 30)

### Concepts and Techniques

## 'Optx' Improves CDC 6600 Runs

BEDFORD, Mass. — A series of programs that are said to greatly reduce the core requirements of programs executed on a Control Data Corp. 6600 mainframe, Optx is now available on the eastern section of CDC's Cybernet remote computing service network, according to the developer, Brendan J. Welch.

Optx analyzes the operation of the user's program at the binary-coded loader level and determines the tree structure of the subroutines within the program so they can be brought into memory as needed, rather than in an unsegmented monolithic entity, Welch said.

The reduction in core requirement is usually offset by a small increase in running time, he admitted, but the amount of trade-off between core and time is selectable by the user.

While Optx is primarily intended to reduce costs to the user, some may find it useful because it allows programs previously too large to fit within memory to be broken into effective overlays and used without reworking their logic.

In a remote computing environment, the optimizing of a program may permit it to be used in a better job classification for faster turnaround. In an in-house setting, it may help control costs by making more effective use of memory, Welch added.

Although he has used Optx's capabilities almost exclusively with large Fortran programs, the developer believes that, since the optimizer works at the binary loader level, there is nothing that would limit it to that language.

Welch noted that the cost of using Optx is at this point negotiable since some installations may have continuous use for it while others will want to use it "once or twice a year."

A free trial can be arranged by contacting Welch through P.O. Box 253, Bedford, Mass. 01730.

## Pansophic Users Share Routines

OAK BROOK, Ill. — Pansophic Systems, Inc. has released Volume III of its Systems Exchange catalog. Volume III is a compilation of exits and subroutines involving Pansophic products, interfaces with other software and procedures for using Pansophic products in various applications, a spokeswoman said.

The vendor acts as a clearinghouse to gather information for the exchange, assemble the actual source coding and documentation for the routines, catalog them and offer them free to its worldwide client base.

Volume III of the System Exchange includes 70 specific applications "representing hundreds of man-years of programming effort," the spokeswoman said.

The exchange is open to any Pansophic product user currently on maintenance or to anyone who has made a contribution to the Exchange, she said, adding that the catalog is updated semiannually. New routines are inserted as they are checked out and older ones are updated as the software with which they work is changed.

More information is available from Pansophic at 709 Enterprise Drive, Oak Brook, Ill. 60521.

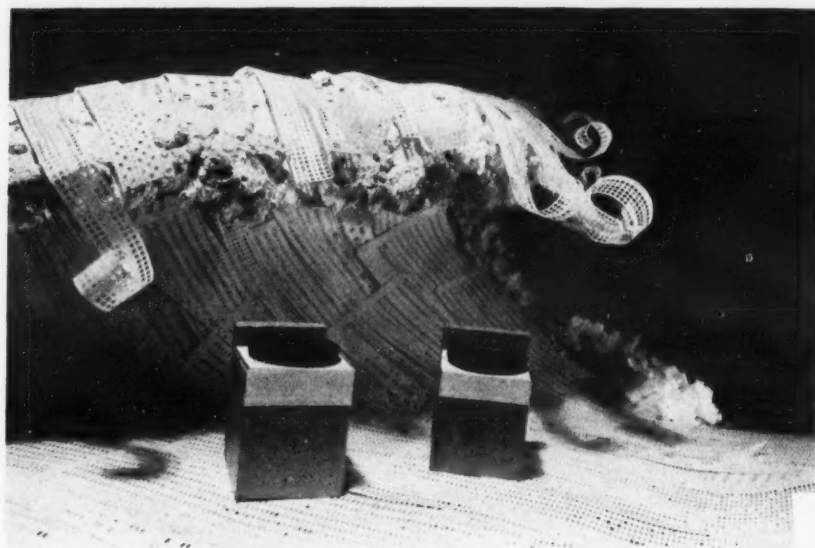
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# Not Just for Data Base Work

## Data Dictionary Useful in Systems Analysis

By Chris Gane  
Special to CW

Recently the data dictionary concept has been recognized as an excellent tool for storing and controlling the flood of details that often threatens to drown us as systems analysts.

Another way of controlling this flood is by using a logical data flow diagram which, as the name implies, shows the flows of data in a system, the logical places where data is held (manual or computer files) and the logical processes (clerical or automated) that operate on the data.

This diagramming technique (described in some detail in "Data Flow Diagrams Ease Planning of Any System [CW, Oct. 3]) enables the user to draw a clear picture of a system, eliminating most of the confusing detail found in flowcharts while preserving the important features of the system and showing how the parts fit together to meet the user's needs.

Of course, the detail still exists and cannot be ignored. Suppose, for instance, we show on a data flow diagram a flow called "Orders" coming from "Customers" and going to a process called "Enter Or-

ders." Anyone looking at this diagram could justifiably ask, "What exactly do you mean by 'Orders'?"

In answering this question, we must be careful not to get bogged down in great and unnecessary physical detail, especially where we have a number of different types of orders, each only slightly different from the next.

No doubt the time will come in development where we should specify this physical detail, but first we must get a map of the forest before starting to count the leaves on the trees.

### Top-Down Answers

What we want to do is describe the orders at a logical level, identifying each of the data structures and data elements that make up an order, and we want to have a place to store and retrieve the physical details of each component data element once they have been defined.

Most likely we will find an order consists of some identification, the customer's name and address, and the details of at least one item. So we can give a first-level "top-down" answer to the question,

```

ORDER
ORDER-IDENTIFICATION
ORDER-DATE
CUSTOMER-ORDER-NUMBER      usually present
CUSTOMER-DETAILS
ORGANIZATION-NAME
PERSON-AUTHORIZING-ORDER   optional
FIRST-NAME
LAST-NAME
CUSTOMER-PHONE
AREA-CODE
EXCHANGE
NUMBER
EXTENSION                  optional
.
.
.
and so on.
  
```

Figure 1.

"What do you mean by orders?" by showing just this breakdown into three data structures:

```

ORDER
ORDER-IDENTIFICATION
CUSTOMER-DETAILS
ITEM-DETAIL
  
```

We can expand these further, with notes on their contents, until we get down to the level of individual data elements, as in Figure 1.

We note this data structure

for an order tells us nothing about form layout, field size, whether the field is held in packed decimal, editing characteristics, etc. While it omits this physical detail, it is precise enough for the analyst and the user to review for errors and omissions.

For example, the user might say, "If the customer doesn't give an order number, we will insert an order identification of our own," and the analyst

can incorporate this fact.

If we were to define each data element making up each data structure, describe each data store and each data flow and store all this information in a place where it could easily be retrieved, we would have a data dictionary for the system. A word dictionary carries the definitions and explanations of words in a language, arranged for easy access; a data dictionary carries the definitions and explanations of data (and sometimes logic) used in a system or organization.

The use of a data dictionary has often been at a very physical level, holding the detailed physical definitions of data elements, record layouts and so on. This is well and good, and there are many benefits to be had from this physical data dictionary in system implementation and maintenance.

From our description of the analyst's needs, however, it should be clear the data dictionary also has a central role to play at the logical level in analysis.

Let us review what the analyst needs in a data dictionary:

1. *Data element definitions:* name; description; aliases (other names by which the same data element is also known); allowable ranges of values; meanings of different values for a code.

As the analysis proceeds and the physical makeup of the system becomes clearer, the length of each data element and its physical encoding will be added.

2. *Data structure definitions:* name; description; component data elements; information on volume (where the data structure has an independent existence).

3. *Data flow definitions:* source (external entity or process or data store from which the flow starts); destination; description; data structures that flow down the data flow; volume information (where not carried at the data structure level).

4. *Process definitions:* name; description; inputs; outputs; logic details.

5. *External entities:* name; associated data flows; descriptions.

External entities may be other systems (e.g., payroll/personnel), or departments (e.g., accounts) or logical classes of people or things (e.g., customers, temperature sensors).

6. *Glossary items.* It is very useful to be able to store and retrieve "user jargon" terms that mean nothing to the analyst. Finance people may use the

(Continued on Page 28)

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## Text Work Runs on DP System

SEATTLE — Costing \$2,500, the Document and Text Assembler (Data 2500) package is said to provide users of Wang 2200 small business systems with text-editing facilities comparable to those commonly found only in dedicated word-processing systems.

Marketed by The Office Manager (TOM) and associated dealers throughout the country, Data 2500 enables anything from one-page letters to 500-page specifications and manuals to be typed, edited and printed out, according to a spokesman.

Data 2500 offers simultane-

ous input and output, keyboard buffering, format memory and automatic text and page adjustments. Unlimited insertions and deletions and automatic headings and footings are also supported by the package, according to TOM.

Data 2500 is document-rather than page-oriented. Although text can be accessed, editing and printed by pages, the document is treated as one continuous file of any number of lines of text, the spokesman said.

Data 2500 is a CRT screen-oriented text-editing system. All processing is carried out

on the screen as a function is performed. Screen prompts guide the operator through all steps, he added.

Text is saved on disk as it appears on the screen; corrections are resaved in place of the original text. Word wrap-around eliminates the need for carriage returns after each line and keyboard buffering is said to protect against lost text if the keyboard operator is extremely fast.

When working on documents, the top three lines of the screen are used by the system to communicate with the operator. These lines tell what document is being worked on, what operation is being performed, the current page and line within the document and the current margins and tab settings.

Data 2500 requires a 16K Wang 2200T or a 32K 2200VP processor and a dual floppy or hard disk drive. Simultaneous printing is not recommended on a dual floppy system because of the disk access time.

Data 2500 will not operate on a PCS II with minidiskettes, TOM noted from 550 Industry Way, P.O. Box 88067, Seattle, Wash. 98188.

## Analysts Use Dictionaries

(Continued from Page 26) abbreviation "NPV"; engineers may talk about "shear."

Every user is prepared to explain his special vocabulary to one analyst once but, unless this knowledge can be quickly shared among the people on the team, the users may get impatient when asked to define "accrual" for the seventh time. The data dictionary is a natural place for this.

The contents of the data dictionary may be stored on index cards (about 200 entries seem to be the maximum number practical), keyed into the computer via a text-editing system or maintained on-line via specialized software, of which a number of commercial versions are available.

Whichever approach is taken, the analysts on a project can save time by defining each item once, using the data dictionary as a central store of definitions and, later, where the information is held in machine-readable form, supplying programmers with data definitions direct from the data dictionary, without the labor of coding and reentering those definitions.

Readers with experience or questions on the use of data dictionaries as a tool for analysis are invited to write Chris Gane at Improved System Technologies, 888 Seventh Ave., New York, N.Y. 10019.

## Seminars Set for Spring

KENSINGTON, Md. — A seminar series on various data processing topics will be offered this spring in the Washington, D.C., area.

The topics include data base management, interactive systems, technical data for decision-making, document storage/retrieval, information resources management and micrographics/computer system design, according to the sponsoring organization, Science Information Association.

Some of the seminars are based on graduate courses at American University and George Washington University, while others will be presented for the first time because of developing demand.

Registration for each seminar costs \$295 for each participant and \$250 for second and subsequent participants from the same organization. Enrollment will be limited to 10 persons.

Seminar schedules and applications are available from the association at 3514 Plyers Mill Road, Kensington, Md. 20795.

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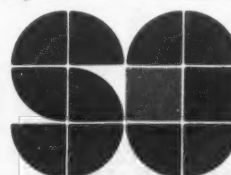
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are forward scheduling, which starts with a work order and projects timing for all steps up to a due date; backward scheduling, which starts with a due date and projects timing backward to establish a start date for each operation; mid-scheduling, which allows forward and backward scheduling from a known bottleneck; and manual scheduling, which allows the user to manually enter job start and end dates.

XCS provides on-line, interactive computer services to manufacturers, distributors, utilities and government organizations in more than 100 cities. The service is headquartered at 701 S. Aviation Blvd., Los Angeles, Calif. 90245.

## Creativity Vital Factor, Even in Maintenance Work

(Continued from Page 25)

talent had been involved and utilized.

The other things the maintenance group is often called upon to produce is add-ons or enhancements. These are often considered insignificant to many analysts and programmers because they are usually relatively small, compared with the system as a whole, and they are usually supportive in nature to the functions already operating.

If an examination of what processes are required when implementing the add-on, it would again be realized that a great deal of creativity and often ingenuity is required. For example, when an enhancement is being added, the individual who is designing the changes

required must first become extremely knowledgeable in the system as it presently exists. This is to enable him to be aware of precautions he must consider such as interfacing with other subsystems and data base integrity.

He will probably be dealing with different programming styles, assuming that more than one individual designed and wrote the original system. This is not to be taken lightly; if one is to understand a given program, he should be able to examine the code and understand why that particular approach was taken.

To do this one must put oneself in the position of the author of the given task or program and adopt his style as much as possible while reviewing his work, which may be impacted by any changes made.

After a thorough knowledge is obtained on the existing situation, only then can an add-on be designed. During the design phase of the add-on, a constant vigil must be kept on the impact the addition may have on storage and timing of the system.

Data base utilization, efficiency and sizing are items that must be given the same consideration as when the original system was designed. The impact the new function may have on existing functions must also be considered. Does this new function duplicate any part of existing coding? If so, is the duplication required? Does the new function overlap or eliminate the need for coding elsewhere in the system, or does the similar coding serve another function for entirely different reasons?

Care must be exercised to ensure that destructive interference in the way of coding is not inadvertently implemented. If all of these items are given the attention needed and the user requirement is met satisfactorily, the design should be implemented efficiently.

After coding is complete, vigorous testing is required. Not only is the new function tested to determine that the goals of its intended purpose are met, but the entire system must undergo complete testing to verify that the new function does not adversely impact any other function in the system.

With this phase complete and all necessary documentation changes made and user training complete, the system is ready to run.

If all of the foregoing items were attended to with the detail necessary to accomplish a satisfactory system enhancement, an efficient, well-planned, successful running, neatly documented, user satisfied, easily maintainable system would be the result. This also describes the goal of the system as originally delivered and indicates the need for originality, creativity and ingenuity that went into the original system are also required processes for system enhancement.

It should, therefore, be clear that at least as much talent and creativity as is required in an original system development group is also required in the maintenance group. This will no longer be the case when the group that developed the original system is flawless and develops the ability to anticipate all future user requirement changes.

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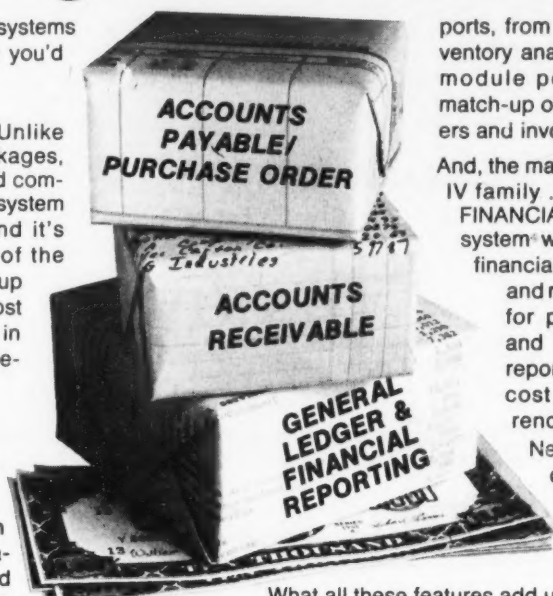
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# Nets Seen Key to Terminals' Success

By Ronald A. Frank  
CW Staff

NEW YORK — Data communications networks hold the key to successful implementation of terminal systems, according to Dan A. Barnes, vice-president of marketing for TRW Retail Systems.

Originally, TRW configured specialized turnkey point-of-sale (POS) terminal systems for specific customers but this is changing so that today's POS terminals can fit a variety of retail applications, Barnes said in a recent interview.

There is now a trend to incorporating addi-



Dan Barnes demonstrates POS features.

tional functions in terminals that operate on existing private-line nets run by the larger retailing chains, Barnes said.

Among these newer applications that are being overlaid onto existing terminal systems, Barnes listed data entry, administrative messages and bank deposit information — all of which can be transmitted to corporate DP centers from remote retail sites. The data can be transmitted by individual terminals or it can be batched in larger stores and then transmitted after it has been compiled from a number of terminals, Barnes said.

As an example of additional terminal uses, Barnes described the prototype system developed by TRW that would add timekeeping functions to an existing POS terminal site. By integrating the timekeeping operation with an existing network, a user can get more efficiency out of his DP center and also obtain increased utilization of existing network facilities, he said.

The manual time cards now being fed to data entry depend on having the information translated into CPU-compatible form.

But if employees use timekeeping terminals, entering data with magnetic stripe ID cards, the data-entry interim step would be eliminated. And such a system could also be used to keep track of employee productivity information, Barnes added.

Rather than viewing POS display terminals as simple CRTs, TRW calls them "retail windows" that can provide management with administrative reports of sales and associated data, keep track of inventory and selling trends and provide bank deposit data at the close of business each day.

As an example of nonsales transactions, Barnes said a TRW 2001 terminal could be used after store hours to transmit price changes to a specific department from a central site. This information would then automatically be printed for salespersons when the terminal was activated at the start of the next business day.

With software and programming designed to fit specific retailing needs, basic terminals can be expanded with a variety of applications, some of which still remain to be implemented, Barnes said.

## Sycor Adds Entry-Level System

ANN ARBOR, Mich. — Sycor, Inc. has introduced the Sycor 405 distributed data entry and processing system for users desiring an entry-level terminal system with the capacity to expand upward.

The 405 can be linked with other 405s or with the firm's 445 processors through

Sycor's recently introduced Sycorlink local-mode networking facility. Users can increase their total processing capability, the number of keyboards in a network and the amount on-line disk storage by adding 405s and/or 445s to the on-site Sycorlink network, the firm said.

The terminal system can communicate with most IBM mainframes and can emulate IBM 2770, 2780, 3770, 3780 and 3774 terminals, a spokesman said. The system can also emulate teletypewriters, and an IBM 3270 emulator is planned for the fourth quarter of 1978.

The 405 provides up to 64K bytes of main memory, 2M bytes of flexible disk storage, two 2,000-char. CRT terminals, a magnetic tape drive and one bidirectional matrix or line printer.

Although the 405 is an entry-level system, its ability to process two different jobs simultaneously gives it the capability of larger system, the company said, adding that a 405 user doing program-controlled data entry can at the same time be printing a payroll report or transmitting inventory transactions to another system.

The 405 CRT incorporates a glare-resistant

(Continued on Page 36)

## Eastern Blending Two Systems To Consolidate Communications

By Molly Upton  
CW Staff

MIAMI — Eastern Airlines is in the process of blending its two separate IBM- and Univac-based communications systems into one, which it calls Unipars, according to J. Thomas O'Connor, director of technical programs for Eastern's System One operations.

The plan will enable the firm to reduce the number of private-line networks from two to one and eliminate one type of terminal at each of its reservations sites, he indicated.

The Eastern DP operations at Charlotte, N.C., will be phased out after the consolida-

tion process, and its functions will be transferred to the center here, he said.

Currently, Eastern uses three Univac 494s at Charlotte to control the airline's administrative message switching as well as handle various applications.

From Miami, two 370/195s, a 370/168 and 370/145 handle a modification of IBM's passenger airline reservation system (Pars) operating under a modified Airline Control Program (ACP) dubbed Shared Multiple Applications Real-Time System (Smart).

Under Unipars, modified Raytheon PTS terminals will enable operators to select

(Continued on Page 34)

COMMUNICATIONS

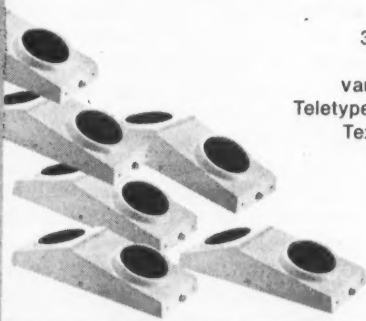
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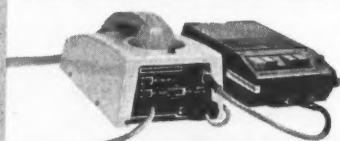


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## With Local, Remote ATCs

# Courier Enhances Family of Terminal Systems

TEMPE, Ariz. — Courier Terminal Systems, Inc. has announced enhancements to its family of IBM-compatible terminal systems. The new models provide advanced communication capabilities and features for improving operator productivity, the company said.

The systems include Advanced Terminal Controllers (ATC) for use with IBM 360/370 CPUs. The ATCs come in local models for use at the computer site as well as remote models for use with data communication facilities. The remote ATC comes in a mini version for use with up to eight displays and/or printers. A larger version of the remote, as well as the local ATC, can

be used with up to 32 displays and/or pictures. The remote ATC communicates in binary synchronous (BSC) or Systems Network Architecture (SNA)/Synchronous Data Link Control (SDLC) protocols compatible with the IBM 3274 Model 1C control unit, the company said.

The local ATC operates in both SNA or an IBM 3272 environment. The SNA environment corresponds to an IBM 3274 Model 1A, while the IBM 3272 environment corresponds to an IBM 3274 Model 1B.

### ATC Improvements

Improvements related to the ATC are also incorporated in the Courier 270

display terminals. A display model, when attached to the ATC, offers increased capacities of 2,560 and 3,440 characters on its CRT display screen. Capacities of 480, 960 and 1,920 characters are also available. A status line for relaying error information and terminal system status is located at the bottom of the display screen.

The Courier 270 display system is compatible with similarly configured systems in the IBM 3270 line. A Courier 270 system using an ATC attached locally to an IBM 360/370, with 10 displays and two medium-speed serial printers, may be purchased for approximately \$45,000, or leased for a 36-month term for \$1,150 per month,

the firm said.

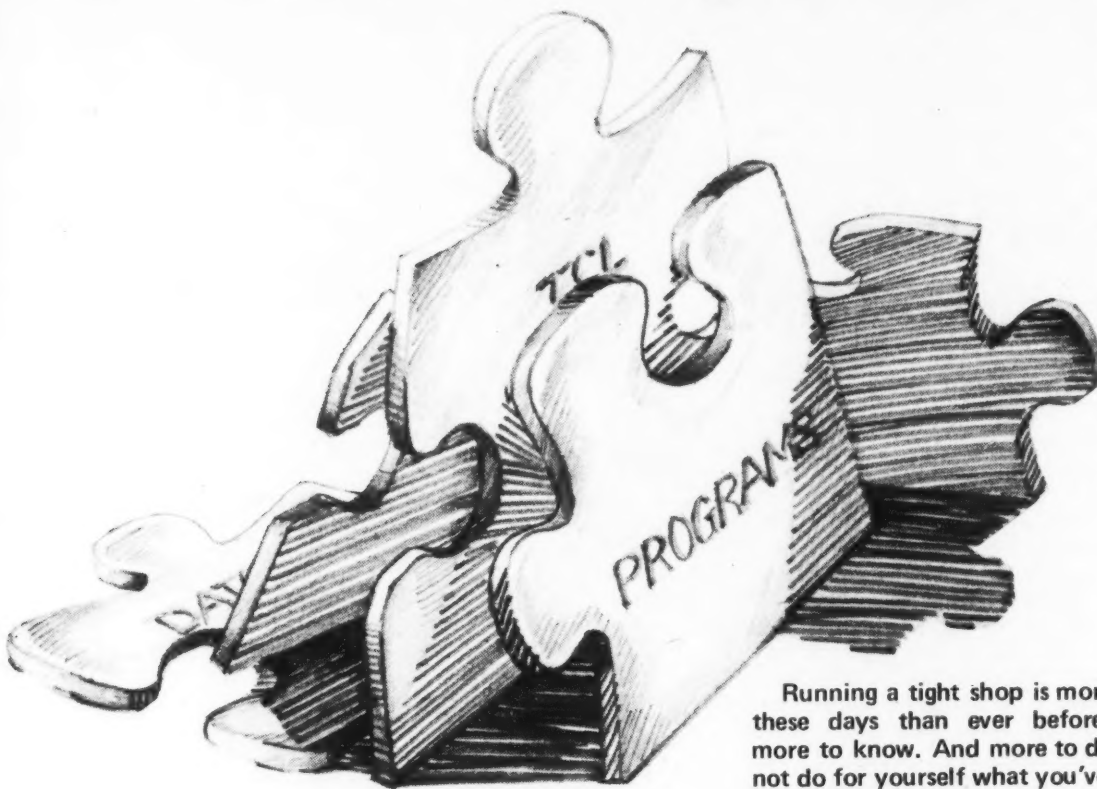
A comparable IBM 3274 costs almost \$61,000 if purchased, \$1,700 per month if rented or \$1,450 per month on IBM's 24-month lease. The Courier system would save the user almost \$16,000 if purchased, or \$10,000 in the first three years if leased, Courier said.

A Courier 270 system using a small remote ATC, communicating over phone lines to an IBM CPU with seven display terminals and one printer, sells for approximately \$24,000 or \$650 per month on lease, the firm said.

A comparable IBM 3276 system costs over \$33,000 if purchased, \$900 per month if rented or \$750 per month if leased, it added, noting that in this case, the Courier savings is approximately 25% if the equipment is purchased or 15% on a three-year lease.

Courier is at 1515 W. 14th St., Tempe, Ariz. 85038.

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## Racal-Milgo Beefs Up 24 LSI

MIAMI — Racal-Milgo (ICC) has unveiled improved versions of its 24 LSI modems, operating at 2,400 bit/sec.

The 24 LSI Mark II now provides a standard range of pushbutton test features. Included are internal error test, receive test, analog loopback and digital loopback testing capability. Nine LED indicators provide indication of key EIA interface signals and modem status.

Dial-up models of the 24 LSI Mark II are registered with the Federal Communications Commission so that users can connect directly to switched telephone networks through standardized data jacks, without special access devices, the company said.

The private-line version of the modem costs \$1,092 or \$50/mo on a 30-month lease. The dial-up version costs \$1,275 or \$57/mo on a 30-month lease. Prices are for 10 units from Racal-Milgo, Inc. at 8600 N.W. 41st St., Miami, Fla. 33166.

## Telenet Expands 1,200 Bit/Sec Service

WASHINGTON, D.C. — Telenet Communications Corp. has announced an expansion of 1,200 bit/sec service and support for the recently introduced Bell 212 full-duplex modem.

Network subscribers will now be able to choose either the Bell 212 or Vadic VA 3400 full-duplex modem for private dial access in 81 U.S. cities, according to a spokesman.

The 1,200 bit/sec public dial-in service using the Bell modem will be introduced in early 1978 in Chicago, Los Angeles, New York, San Francisco and Washington, subject to state approval of tariffs for the new Bell equipment.

Communications costs for a terminal operating at 300 bit/sec average \$3 an hour on Telenet. In comparison, communications for a terminal operating at 1,200 bit/sec average just \$4.40 an hour with three to four times the throughput, the spokesman said.

Telenet is at 1050 17th St. N.W., Washington, D.C. 20036.

# RJE Systems Undergoing Fast Evolution at GE

By C.R. Stewart Jr.

Special to CW

The Aerospace Controls and Electrical Systems Department of General Electric Co. in Binghamton, N.Y., has been using remote terminal processing in its business environment for a number of years — since as early as 1972.

Reflecting on the past gives some insight into how the department progressed and the changes that occurred in remote and other processing. The department was established in 1949 as the Aerospace and Ordnance Section. It then became the Avionics Business Section of the Light Military Electronics Department between 1953 and 1955, Avionics Controls Department in 1967, Aerospace Instruments and Controls Systems Department in 1971 and, finally, the Aerospace Controls and Electrical Systems Department in 1974.

DP started around 1955 using tab equipment such as IBM 604 calculators, 407 tabulators, 521 summary punches, 083/084 sorters, 077 collators and 519 reproducer/summary punches. Our first electronic computer, the Univac 1004, came in 1961; this system reached its maximum capacity and in 1964 was replaced by the GE 304B. The 304B served our business information needs through 1967 when its processing capacity was exceeded and it was replaced by the GE 415.

In 1968, the GE 415 was upgraded to a GE 435 to utilize the additional memory available. In the same year, the printing volumes were such that a GE 115 was brought in to relieve some of the print load from the GE 435.

The main purpose here was to provide telecommunications capabilities for remote scientific processing, as well as paper tape to magnetic tape conversion for the factory data collection systems.

In 1972, DP centralization became a reality with regional centers to handle remote DP that was previously handled by the local sites.

The purpose of centralization was mainly to take advantage of the major advances in technology and large processing capabilities of the third-generation machines, spreading the cost over many departments, and subsequently reducing the overall cost per department for the computing equipment.

In the case of our regional center, a switch was made from a GE 635 to a Honeywell Information Systems, Inc. Level 66/60. But where did this leave the department that was not designated a regional center? In order to determine this position, let's investigate the immediate impact DP centralization had on the nonregional center site.

In order to convert information management systems to the regional center, there had to be some means of getting the data to the center and back. This meant using the GE 115 terminal DP system equipped with 2,000 bit/sec dial-up telecommunications facilities that had been used for low-volume scientific work.

Although processing volumes were very low at the advent of conversions by the latter part of 1973, the GE 115 remote job entry (RJE) terminal system was overwhelmed and it could not begin to meet the total remote processing

needs of the department. It was obvious the GE 115 terminal would have to be replaced, since it had been upgraded to its limit; dedicated 9,600 bit/sec lines and latest remote-batch software still could not satisfy the department's processing needs.

The GE 435 was not being fully utilized because conversion to the regional center had taken most of its processing load.

In 1974 we invested the money, a nominal amount, to convert the GE 435 local batch-processing system into an RJE terminal. The results were good. The terminal met our immediate needs and provided the flexibility needed to handle expanding future needs.

Business information systems were

developed via the terminal at the regional center and we experienced no terminal capacity overflows. But something else happened — the system software was becoming very sophisticated RJE terminal software. Software that at one time only transmitted and received data could now do concurrent printing, card punching and file transmission. As a matter of fact, the GE 435 terminal had achieved a degree of functionality rivaling hardware and software developed by vendors whose main objective was to market RJE terminal equipment.

Today, demands have tripled with regard to the functionality needed in an RJE terminal. The GE 435 is approaching the limits of its capacity and suffering from old age. The replace-

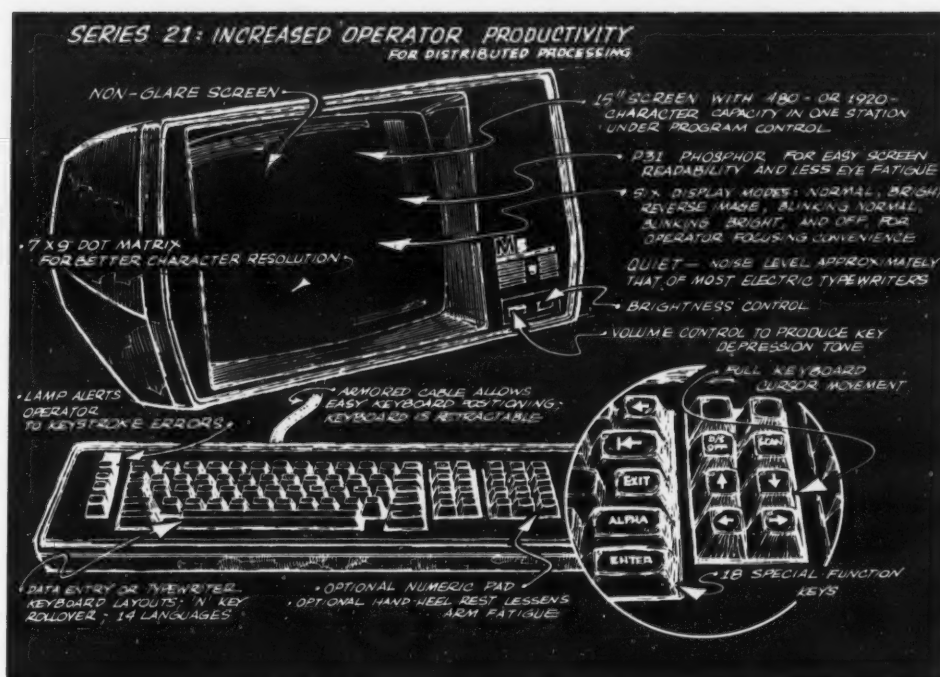
ment for the terminal will have to provide a cost-effective solution to our processing needs, taking into consideration that telecommunication technology has changed and an on-line inquiry and update is a necessity.

Advances in RJE terminal versatility now provide for time-sharing line concentration. Disk subsystems for down-line loading of data bases and interface software with the RJE terminal functions are available.

These and other requirements must be met by the remote processing site, while cost must remain within the range of the objectives of centralization, reducing the cost of upgrading computer equipment to each department by large capacity regional cen-

(Continued on Page 38)

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# Eastern Airlines Consolidating Communications

(Continued from Page 31)

either the Uniscope 100 mode or the Pars mode, he said. Thus there is no operator retraining involved, he said.

The Pars system is based on a 6-bit code, whereas the Univac-based systems have Ascii code. Basically, although data may be entered as if on a Uniscope 100, the system will convert it to 6-bit code handled by the IBM CPUs, he explained.

All communications, whether in the Pars or Univac format, will be received by the IBM machines, which will either handle it or convert it to Ascii for processing on the Univac 494, according to Steve Barnes, manager of communications systems.

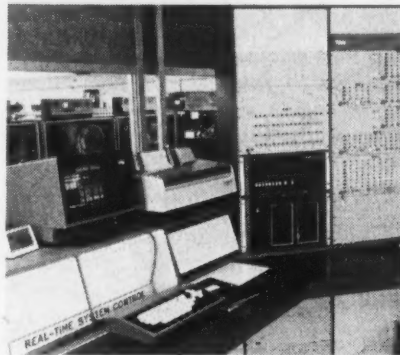
Therefore, data being sent in from

the field may undergo two conversions: from the Univac format to the IBM format back to the Univac format for processing on the 494, he said.

After an initial testing phase in December with about 16 modified terminals on-line, Eastern is implementing the modifications and taking out the Uniscope 100 terminals, he said. About 500 terminals are scheduled to be modified by June 14, he indicated.

The hardware modifications, being implemented by Raytheon, involve some new printed circuit boards as well as some different keycaps.

The revamped Eastern network will include both Honeywell Information Systems, Inc. Model 7/16s, now in use with the 494s, as well as IBM System/



CW Photos by M. Upton

A T-Bar 3915/3916 automatic switch unit lets Eastern switch peripherals from one CPU to another.

7s, with which the firm has had experience, O'Connor said.

The System/7s will handle the 6-bit code used in Pars while the 7/16s will handle teleticketing operations and other applications previously supported by 7/16s.

Eastern is in the process of replacing System/7s used as trunk monitors with Collins automatic call directors, he said. Like the System/7, the Collins unit facilitates predicting the appropriate level of staffing for reservations, but it also provides headsets so Eastern will no longer rent these from the Bell System, he said.

The Charlotte facility is scheduled to be phased out by the second half of this year after all offices are converted to Unipars, he said. About 60 people from Charlotte have already transferred to Miami, O'Connor added.

With the focus on the conversion of the communications system, Eastern has about 90 people in systems programming, of whom 50 are involved with communications and 60 in operations, he said.

## In-House Creativity

Eastern's extensive DP operation was facilitated by in-house programming creativity.

ACP was modified to accommodate Smart, which enables different users to

retain their distinct data bases. The Pars portion of ACP is also highly modified, he indicated.

Through the resulting System One, Eastern serves several other airlines and corporations.

In addition, an effort with American Airlines produced Sabretalk, a high-level compiler for ACP which is also installed at other airlines, he said.

The firm began to take in outside work when in 1972 it installed a 370/195 as a replacement for a 360/65 and found it was using only about one third of the system's capacity, O'Connor said.

Then in 1974 Eastern developed for CIT and its Canadian unit a financial system based on its version of Pars. CIT has loan offices throughout the U.S. Other clients include four airlines: Piedmont, Ozark, Air West and Southern, all of which have their own data bases operating on System One, O'Connor indicated. Last October, the firm separated its operations onto two



Two IBM 370/195s preside over the Eastern DP complex.

on-line CPUs running its version of ACP. Generally, a 195 is held as backup because a 168 cannot completely substitute for a 195, he said.

## 'Close to Full'

Even with separating the client work onto a different CPU, Eastern's reservation work is coming close to filling a 195, he said.

Eastern has ordered five 3033s and IBM is quoting a 30% to 31% gain in usable cycles on its version of ACP, O'Connor said. A 195 with standard Pars handles about 200 message/sec, so that would mean about 260 message/sec with a 3033, he said.

O'Connor thinks he will make it through 1978 on the 195s. However, then he will need two 3033s for Eastern, and will have to make a decision on what clients need.

One of O'Connor's problems is the demand for people trained in ACP. During the past two years, Eastern has lost 24 people, many of them to American Airlines, he said.

To counter this trend, Eastern has begun a program to identify and train those people with roots in the community and a commitment to the company, he said.

## Power Critical

With so much of its gear devoted to real-time work, power is critical. The site has two lines from the local utility feeding into a bank of batteries. The power is reconstituted, thus eliminating spikes, and then distributed to the center. A complete backup system includes batteries capable of functioning for 30 minutes at full load, as well as a diesel system, which usually activates within one minute of a power failure.

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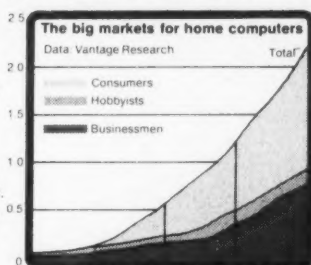
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Data Systems



# Sycor Introduces Entry-Level DDP System

(Continued from Page 31)

15-in. screen housed in a desktop unit. An optional display stand enables the operator to adjust the angle of the screen.

The 405 utilizes a multiple-processor architecture which reportedly increases system throughput. In addition to the main processor, additional processors are located in each peripheral controller, thereby freeing the main processor from I/O control functions.

## Bidirectional Printer

Available with the 405 is the Sycor Sprinter, a bidirectional, micro-processor-controlled matrix printer that operates at 60-, 120- or 180 char./sec. In addition, 300- and 600 line/min

printers may be used with the system.

The system can operate in binary synchronous (BSC) and Synchronous Data Link Control (SDLC) transmission modes at speeds up to 9,600 bit/sec.

Available control programs include Interactive Remote Job Entry; batch transmission using various IBM protocols; and Sycor's Network Control System, which provides automatic polling and selection of remote 405s and other Sycor systems such as 445s, 440s, 350s or 340s. Three programming languages are available: Cobol, Basic and TAL 2000, Sycor said.

Sycor Cobol is an Ansi Cobol subset with interactive display support extensions. Cobol may be used for transaction processing or for intelligent data

entry with concurrent batch processing, the firm noted.

Sycor Basic provides a business and engineering mathematics language for solving common financial problems.

TAL 2000, Sycor's own terminal application language, serves as a common bond between Sycor products. It is designed for users who need a language specifically for intelligent data entry programming.

The 405 handles job streaming, which allows a sequence of jobs to be run automatically, virtually eliminating job initiation keying errors, the company said.

Data security on the Sycor 405 is controlled by an optional keylock which allows the user to lock out activity on the terminal and by a program

function key lockout which enables the user to restrict entry into selected system facilities.

A "typically configured" Sycor 405 system incorporating 48K bytes of main memory, 500K bytes of flexible disk storage, one CRT terminal, one Sprinter printer and a communications adapter can be purchased for \$19,850. Comparable monthly lease rates are \$538, \$497 and \$456 for one, two and four years respectively, including maintenance.

Initial deliveries of the Sycor 405 are scheduled for the third quarter of 1978, from 100 Phoenix Drive, Ann Arbor, Mich. 48104.

## Data Link Suits Fiber Optics DP

W. BOYLSTON, Mass. — A full-duplex, asynchronous RS-232C data link engineered for fiber-optic DP applications is available from Valtec Corp.

Designed for users with little or no experience with fiber optics, the data link accepts the 25-pin RS-232C electrical plug as input and converts directly to optical digital data transmission. The output is connected directly to preterminated fiber-optic duplex cable, Valtec said.

Each end of the link contains a receiver, transmitter, power supply and power cord with wall plug.

Transmission capability from dc to 20 kbit/sec over distances up to 3,000 feet is built in. The first model of a Fiberdata series of products, the RS-232C link provides users with the option of modem elimination, low-cost cable installation and secure lines.

Prices are in the \$1,000 range for a link pair plus cable costs of approximately \$1 per foot. Valtec Corp. is at 99 Hartwell St., W. Boylston, Mass. 01583.

## Coupler Compatible With Bell 212A

PHOENIX — Omnitec Data has unveiled the Model 701R acoustic coupler, which operates at 300 bit/sec.

Described as compatible with the Bell Model 212A data set, the unit can also operate at speeds up to 600 bit/sec. Other features include teletypewriter and RS-232 interfaces, acoustic or hardwired coupling and half- or full-duplex operation.

The unit costs \$341 from Omnitec Data at 2405 S. 20th St., Phoenix, Ariz. 85034.

## Low-Speed Unit Bows

FALLS CHURCH, Va. — The Model 88-Modem from International Data Systems, Inc. (IDS) provides communications over either the switched telephone network or private lines at any software selected transmission between 66- and 600 bit/sec.

The unit is fully compatible with Bell System 103A modems and provides either half- or full-duplex operation, the firm said.

The 88-Modem is available in kit (\$245) or assembled form (\$395) from IDS at Suite 200, 400 N. Washington St., Falls Church, Va. 22046.

# WANG'S PCS-II

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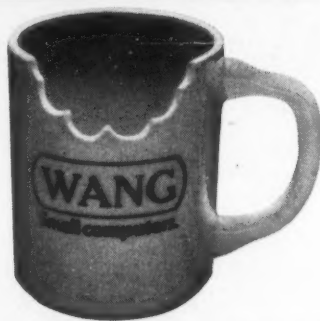
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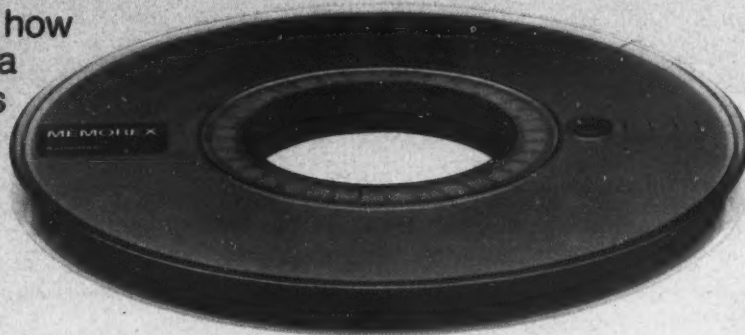
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**MEMOREX**CELLENCE



# Gandalf Adds Two Versions of PACX System

WHEELING, Ill. — Gandalf Data, Inc. has unveiled a third-generation private automatic computer exchange system (PACX III). This terminal switching port selection and contention system, while retaining all of the operating benefits of the earlier PACX systems, includes two features not previously available, Gandalf said.

Terminal users may access PACX III and request a specific service class using a terminal keyboard class select system. No additional hardware or other changes are required at the terminal. Existing communications links reportedly need not be altered and may continue to operate via the dial-up network, multiplexers or digital networks.

With the keyboard class select op-

tion, the terminal user types a single character to gain access, followed by a two-digit class code assigned to the requested service. PACX III searches for a free port of the requested class if one is found, the terminal connection is made and if no service is available, the terminal is disconnected, the firm said.

PACX III also has a statistics port which replaces the standard control/monitor facility of PACX I and II models. The statistics port may be connected to the CPU or other data-handling device. The port accepts commands and generates statistical data at 2,400 bit/sec asynchronous, accompanied by time of day. Messages are in Ascii and use the mixed radix port and terminal numbering system common to all PACX systems, Gandalf

said.

PACX III delivery is 90 days from date of order, with prices starting at \$10,500.

## Mini-PACX Offered

Gandalf also has a "mini" version of the larger-scale PACX systems. The Mini-PACX system, which is designed for both high-speed asynchronous and synchronous operation up to 9,600 bit/sec and 19.2 kbit/sec respectively, has the ability to handle up to 48 terminals and 32 computer ports of varying speeds and communications codes allowing terminal switching port selection and contention, the firm said.

Depending upon the Mini-PACX configuration, the unit sells for between \$6,000 and \$20,000, the com-

pany said.

Mini-PACX may use dedicated lines which can be owned or leased, and the system is capable of fast response to request for service — less than half a second, according to Gandalf.

The Mini-PACX system can be re-configured to accommodate changes in system loading and in contention ratios on different classes of services, Gandalf noted.

Mini-PACX delivery is 60 days from the firm at 1019 S. Noel St., Wheeling, Ill. 60090.

## Concentrator Collects Data For 360/370s

ROCKFORD, Ill. — The P1-5 data concentrator from Phone 1 can connect push-button telephones to an IBM 360/370 CPU for data collection. It can also collect the same data as a complete off-line stand-alone system, according to the firm.

The P1-5 will answer up to 16 callers simultaneously and record their entries onto a 3740-compatible diskette and/or send the information to the 360/370 CPU via the multiplexer channel, Phone 1 said.

Optional CRT/keyboards are also supported as terminals for those users who need the alphabetic input not possible with their push-button dial telephone.

Standard features on the P1-5 include dual 3740-compatible diskette reader, battery backup power supply and Modulus 10 checks for data validity.

The cost of a P1-5 data concentrator "averages \$300 per month." The optional communicating CRTs are \$17 per month and a 3272 emulation package for the P1-5 will be available by March 1, the firm said. Phone 1 is at 1330 E. State St., Rockford, Ill. 61108.

## RJE Systems Evolving Fast

(Continued from Page 33)

ters. But how does a remote site accomplish this and still meet its information processing requirements?

Many vendors offer solutions to this dilemma for varying prices. Suppose we impose a monthly ceiling fee of \$10,000. The Datanet 700 series from HIS, for example, provides an adequate solution to the problem of direct replacement of the GE 435, offering such features as Multimessage Interface (MMI) software, off-line printing and time-sharing line concentration. Increased versatility may be available in that firm's Level 6 with a variety of configurations and options that could possibly provide increased functionality and performance over the GE 435 at comparable prices.

But not only HIS offers alternatives in this dilemma — Burroughs Corp., IBM, Digital Equipment Corp. and many other vendors have offerings that could solve this problem in a cost-effective manner.

C.R. Stewart Jr. is manager of programming techniques and software development at General Electric Co., Box 5000, Binghamton, N.Y. 13902.

# Mini/Micro 78

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## SPECIAL SEMINARS:

MONDAY, APRIL 17  
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**COURSE OBJECTIVE:** Beginning with a brief review of microcomputer hardware and software, this applications course is intended to build on your knowledge of basic hardware configurations, memory systems, I/O Schema, and debugging methods. Understanding the differences in approach for applying minicomputers and microcomputers will be the theme of the course. The emphasis will be on microcomputer applications. Specifically, the software development process, development of the hardware system, hardware/software tradeoffs, interfacing, system specification, and some development cases will be covered. A general understanding of the process is one goal of the course. The course will close with an explanation of the important highlights of the hardware development process.

## COURSE OUTLINE:

1. Reminder on current minicomputer characteristics and capabilities.
2. Review of microcomputer hardware and software.
3. The software development process.
4. Development of the hardware system.
5. Hardware, software tradeoffs.
6. Interfacing.
7. System Specification.
8. Some Development Case Studies.

Sponsor: The Institute of Electrical and Electronics Engineers (IEEE)

WEDNESDAY, APRIL 19  
STEP-BY-STEP DESIGN OF MICROPROCESSOR SYSTEMS

The aim of the course is to expose the participants to step-by-step procedures for the design and implementation of microprocessor systems using the following modes of operation: (1) Wait/go; (2) Test-and-go (test and skip); (3) Interrupts; and (4) Direct Memory Access.

The design procedures which are accomplished in five well-defined steps, will be demonstrated and verified experimentally in class. Lecturer: Prof. D. Zissos, The University of Calgary, Canada.

Sponsor: The International Society for Mini and Microcomputers (ISMM)



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## Within State DP Center

# Dialogue With Users Key to OCR Switch

By Frank Vaughan  
CW Staff

SAN DIEGO — The key to the success of the OCR system conversion in the state of West Virginia was open communication channels between OCR management and the users and analysts, according to Craig Grayson.

Grayson is manager of OCR services for the state of West Virginia and recently discussed the state's OCR system conversion at the OCR Users Association (OCRUA) Winter Conference here.

In May 1977, the state converted all its existing OCR applications from an IBM 3886 to an Input 80-C1 from Recognition Equipment, Inc.

The OCR center in West Virginia is located within a division of the Department of Finance and Administration, Information System Services (ISS), which is responsible for providing all DP services for approximately 50 departments within state government. ISS is organized into two major units, services and systems, each under a deputy director.

The systems section is responsible for all programming, systems analysis and application development, he said. The services section is responsible for all functions from the initial input of data to the distribution of the corresponding output, he explained.

The processing services department includes the central computer center for the state government, which maintains twin

IBM 370/158s with an attached processor. In addition to a batch environment of almost 15,000 jobs per month, it operates a teleprocessing network utilizing IMS, CICS

## CW at OCRUA

and Quik-Draft (a bill drafting system) with over 200 terminals state-wide. The entry services section is composed of Input, OCR and support services.

### Formerly Skeptical

"A series of bad experiences in the late 1960s made state government users skeptical of OCR," he said. "What eventually made scanning into a viable technology was a Department of Education need for apti-

tude test scoring. Approximately 500,000 forms had to be graded each spring and fall and the results distributed to schools in a timely manner."

In 1973, an IBM 3881 optical mark reader was obtained in hopes of meeting the needs of the user within the time constraints established. This approach cut the test scoring time down from a period of a few months to about two weeks and became the selling tool needed to enter the field of OCR.

"Shortly after this, the state leased an IBM 3886 character reader. The first application processed was the vehicle registration system for the Department of Motor Vehicles. The success of this application, which scanned approximately 2 million documents per year, prompted requests from other users for additional applications. By the fourth quarter 1974, when a second 3886 was installed, there were 20 operational jobs on the scanners which necessitated operating both units 16 hours a day, five days a week.

(Continued on Page 41)

## Performance Seminar Planned

DELRAN, N.J. — Datapro Research Corp. will hold a three-day seminar examining the techniques of DP system performance and productivity in New York on Feb. 1-3.

The course, entitled Computer Performance Measurement, will discuss ways in which users can make better use of DP re-

sources by more effectively scheduling equipment and operations, a spokesman said. Topics in the course will include improving program performance; generating a systems profile; locating systems blocks; and understanding the capacity of system performance, he stated.

A workshop will also be available to demonstrate certain techniques as they are applied to system hardware and software, he added.

The course will also take place in Washington, D.C. on Feb. 6 and March 27, in San Francisco on March 1, in Chicago on March 13 and again in New York on April 17, the firm stated.

Fees for the meeting are \$425 for Datapro subscribers and \$475 for nonsubscribers. Team and prepayment discounts are also available from the firm at 1805 Underwood Blvd., Delran, N.J. 08075.

## Kennedy Adds Tape Transport

ALTADENA, Calif. — A bidirectional tape transport that can be equipped with one, two or four write/erase heads and has an unformatted storage capacity of 720K byte/track or 2.88M byte/cartridge has been introduced by the Kennedy Co.

The 631 has a normal operating speed of 30 in./sec with an optional speed of 25 in./sec, a spokesman said. Using a phase-encoded format at a recording density of 1,600 bit/in., the unit has a data transfer rate of 48,000 bit/sec at 30 in./sec and 40,000 bit/sec at 25 in./sec, he stated. Reverse search, forward search and rewind operations are performed at a speed of 90 in./sec, he added.

The direct-drive motor features a start/stop time of 25 msec at 30 in./sec; 30 msec at 25 in./sec; and 75 msec at 90 in./sec, the firm stated. Start/stop displacement is .375 inches during read/write operations and 3.38 inches during search and rewind. Power requirements are 5VDC regulated to within 5% and 24VDC unregulated, the firm said.

The 631 also incorporates an integral tape cleaner that removes dust during write/read, search and rewind operations and allows a tape life in excess of 20,000 passes, a spokesman said.

Price of the unit is from \$500 to \$795 depending upon speed and the number of tracks specified. The Kennedy Co. is located at 540 W. Woodbury Road, Altadena, Calif. 91001.

## Switch Replaces IBM 2914s

CLIFFSIDE PARK, N.J. — An 8-channel switch utilizing emitter-coupled logic and designed to replace two IBM 2914 switches in 360, 370 and compatible systems has been introduced by John Beall & Co., Inc.

The unit allows switching of peripheral units and computer channels and is also capable of providing a path to a backup computer, the firm stated. Any of the channels can be logically disabled to isolate a malfunctioning control unit, the firm noted.

The BCS-4 is pre-wired for remote-controlled operations and requires a 50- or 60-cycle power source, a spokesman said.

Price of the switch in an 8 by 8 configuration is \$75,000, with rental on a 12-month basis costing \$1,725. Eight by 6, 6 by 8 and 6 by 6 configuration rentals are priced at \$1,450, \$1,400 and \$1,200 respectively from the firm at 447 Gorge Road, Cliffside Park, N.J. 07010.



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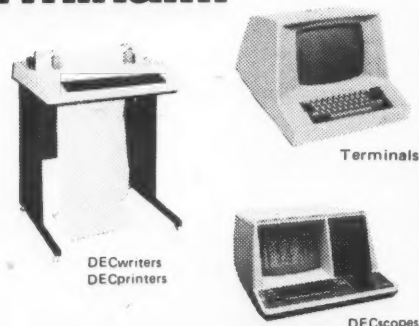
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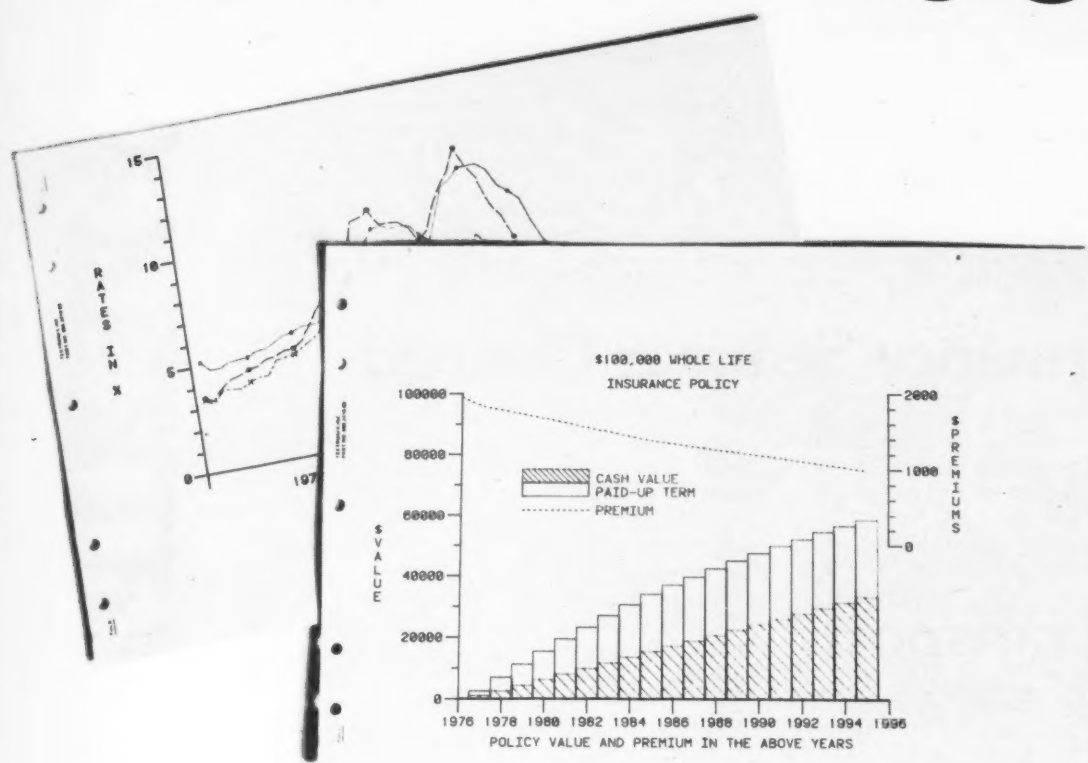
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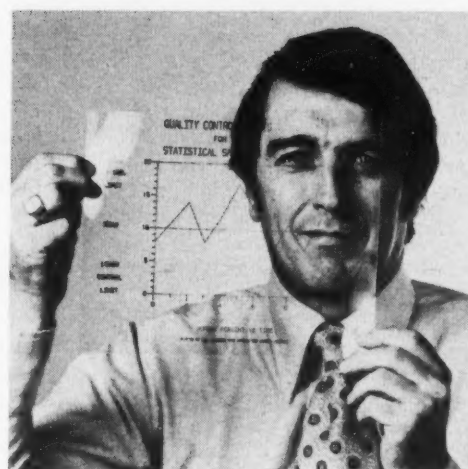
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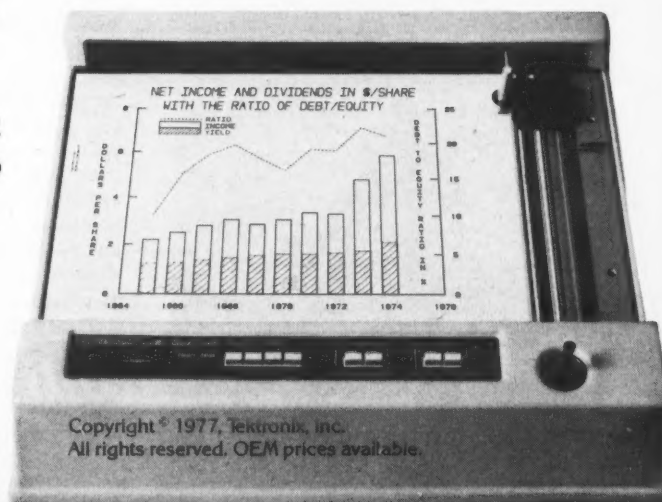
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# Dialogue With Users Aids State's OCR Switch

(Continued from Page 39)

"Early 1976 saw requests for different types of applications from a number of user agencies. They wanted the ability to scan large-volume jobs in a very short period of time and to process multifont applications," he explained.

After a review of the user requirement, it became apparent that the then-installed equipment could not meet either of the user needs, and the state decided that it required a faster, more versatile system.

In July 1976, following an analysis of present and future needs, the Input 80-C1 was ordered, Grayson explained.

The REI system was configured to include the ability to read OCR-A, OCR-B, numeric handprint, Gothic, E13B and marksense in addition to inline reject reentry and microfilm capabilities.

Initially, the goal was to replace the existing hardware with the Input 80-C1, ensuring the same basic capabilities, he noted. The intention was to convert the applications being

processed on the 3886 as quickly as possible and then upgrade the system to include the multifont feature.

Following a period in which equipment requirements were defined, documentation distribution, capabilities seminars for management and systems analysts and individual departmental briefings, all of the software was converted to the language used by the 80-C1. The programs were then tested and debugged on the equipment in Dallas prior to shipment.

This ensured that parallel processing could begin as soon as the installation was completed and that the conversion would continue as smoothly as possible, Grayson claimed.

While the system was being installed

in April 1977, each application was re-documented according to I/O specifications of the Input 80-C1. This was not as great a task as the initial documentation effort, since the methodology and all the required data had already been established.

## User Presentations

Once the documentation was completed, a meeting was held with each user or analyst to explain exactly what had to be done to convert the application to the new system, he said. Attendees received copies of both sets of documentation with detailed comparisons noting the differences, plus those items that would have to be modified in processing the output from the new system.

If there were any changes, they were made jointly during those meetings.

"The total time required to convert the first application, the Vehicle Registration System, was approximately three weeks. The processing of this system through the edit programs was closely monitored by the analyst, user and OCR personnel.

"Within 45 days, over 300,000 truck license renewals had been scanned, a task that traditionally had taken us more than three months to complete," Grayson reported.

"The remaining 12 applications were converted at the rate of one per week through the month of August. By September, all systems were being processed in an operational mode on the new scanner," he added.

## Air Cooling Poses Problem For OCR Center

SAN DIEGO — Despite a basically successful OCR conversion within the state of West Virginia, not all has gone as planned, according to Craig Grayson, manager of OCR services for the state. Grayson recounted the state's conversion experiences at the OCR Users Association (OCRUA) Winter Conference here.

One problem that has hurt the entire operation is the lack of sufficient air-conditioning in the OCR center, according to Grayson.

"At first, additional cooling was not deemed necessary since the existing equipment was operating efficiently in the area, which maintained a normal temperature of about 70 degrees. When the OCR equipment was installed, it became evident that a separate air-conditioning unit would be needed since the new system generated more heat, a situation that could not be regulated by the building environmental control system.

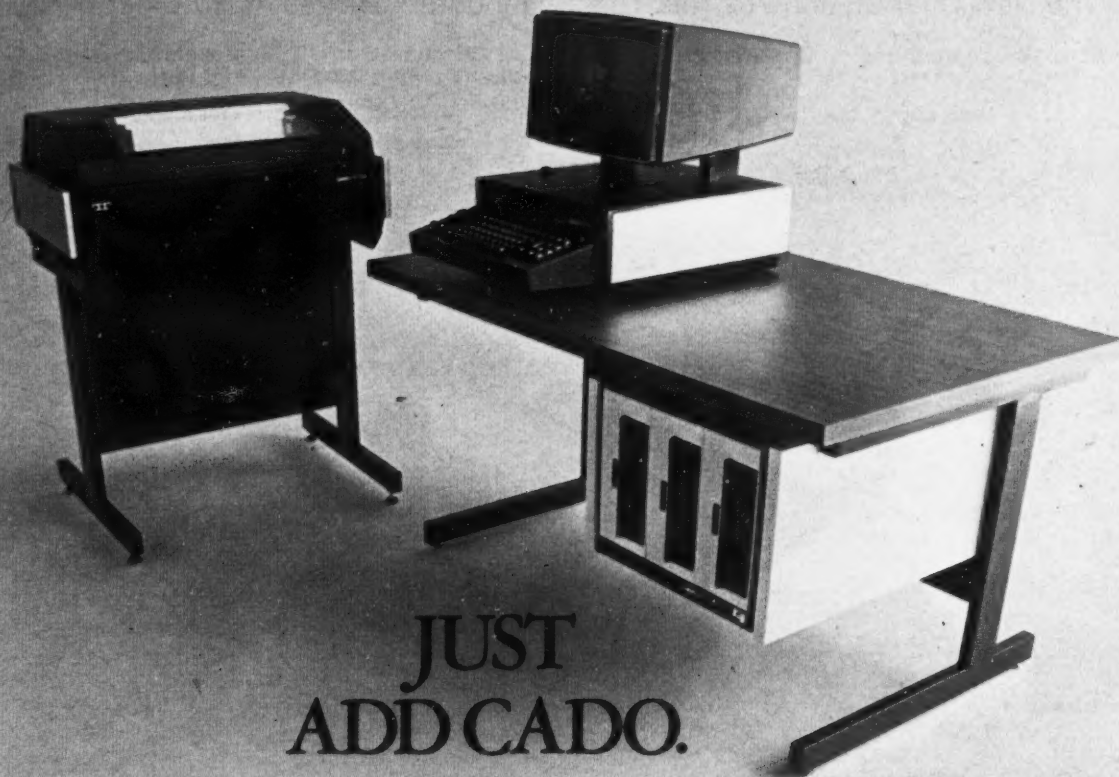
"At the present time, it is necessary to shut down production at various periods during the day to allow the system and area to cool," he explained.

The air-conditioning problem has had its greatest effect on the processing of numeric handprint documents, he noted. The high, variable temperatures affect the hardware in such a way that the reject and substitution rates for handprint characters rise drastically as the temperature increases, he observed.

In most cases, it is possible to circumvent this problem by processing the documents on the second shift or on weekends, although these measures have not completely solved the problem as these applications continue to have high error rates, he explained.

Air-conditioning equipment, scheduled for installation this May, will provide sufficient cooling to eliminate this situation, he forecast.

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## Industry Representative Says

# OCR Paper Strictures Becoming More Flexible

By Frank Vaughan  
CW Staff

SAN DIEGO — The optical quality of paper isn't as critical a consideration as it was in the early days of optical scanning, Robert R. Green of Moore Business Forms, Inc. told an audience at the OCR Users Association (OCRUA) Winter Conference here.

The more recent OCR machines are more forgiving of paper imperfections, weight, caliper and the like. Some scanners don't require an OCR grade of paper, as regular continuous bond is acceptable. This was unheard of not too many years ago, and it is still unheard of in some OCR systems today, he observed.

In discussing the technical considerations of paper use in OCR applications, Green noted that the characteristics of OCR papers may be broken down into two general categories, optical

properties are basis weight, caliper, smoothness, porosity and stiffness — all of which relate to forms and forms handling in the scanner transport system.

## CW at OCRUA

cal properties and mechanical properties.

Among the optical properties are reflectance, opacity, gloss, dirt level and fluorescence content — all of which determine whether the paper can be scanned satisfactorily. Mechanical

Reflectance is a measurement of the amount of light the paper reflects as compared with a known value representing absolute white, he explained. Papers for OCR should be good reflectors, but don't necessarily have to be white; natural tab card stock and pas-

tel shades can be used, he noted, adding that in general, a paper reflectance of at least 70% is acceptable.

Opacity is the property of paper that minimizes the amount of light that passes through it. Normally, opacity is related to the basis weight of paper; as a general rule, the higher the basis weight, the greater the opacity. Normally, a paper opacity of between 80% and 85% is sufficient to preclude problems such as "show through" either from backer printing on a form or black transport belts or obstacles in the read station, he said.

### Dirt Fluorescence

Dirt in paper refers to the presence of nonreflective foreign particles embedded in the sheet. These spots could be unbleached pulp or other foreign particles. Dirt can be a critical factor in some OCR applications, causing character rejects and substitutions, Green warned.

Fluorescent additives are used as optical brighteners throughout the paper industry to enhance the appearance of various grades of white paper. These additives absorb energy in the ultraviolet region of the color spectrum and emit it in the visual range, he explained. Fluorescence can adversely affect the reading and/or sorting of OCR forms in certain OCR systems. This is not to say papers cannot contain any fluorescence whatsoever; a certain degree cannot be avoided in the paper-making process and typically, paper manufacturers have made it a general practice not to use excessive amounts in papers intended for OCR use, Green noted.

### Gloss Undesirable

Gloss is seldom specified by OCR equipment vendors, Green stated. Yet, paper for OCR should be restricted to the low-gloss variety such as uncoated bonds, ledger, index and tab card stocks. Gloss is undesirable because it affects diffused light reflectance of the scanner. It also affects the printability for both the forms manufacturer and user, as some inks won't penetrate the surface of a glossy sheet as well as regular bond and ledger papers, causing printed images to smudge and smear, he observed.

Dirt level and fluorescence are the primary paper characteristics that set OCR paper apart from other quality grades of paper. Some scanners are more tolerant of dirt and fluorescence in paper than others.

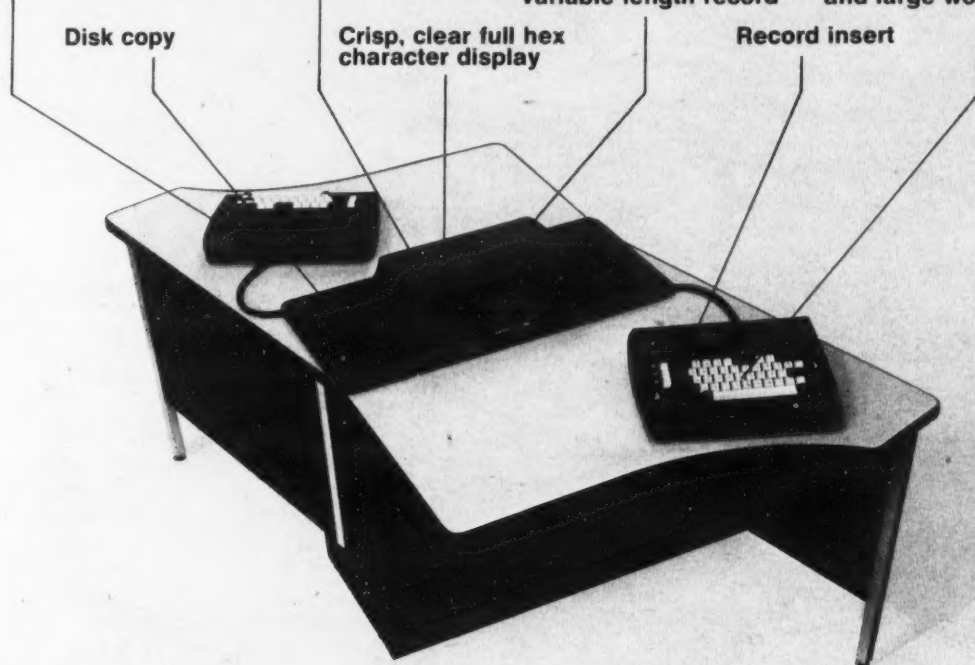
### Standard Prepared

In recognition of this, the American National Standards Institute (Ansi) has prepared a standard on OCR paper, to be released soon, classifying paper according to levels of dirt and fluorescence. OCR paper with a low tolerance to both characteristics will be designated as Type I. Type II will have a low tolerance to fluorescence and a higher tolerance to dirt, allowing a higher dirt count. Type III papers will be those with the highest tolerance to both dirt and fluorescence. Once this standard is officially announced, scanner vendors will be able to advise users on what level is sufficient for given applications, he predicted.

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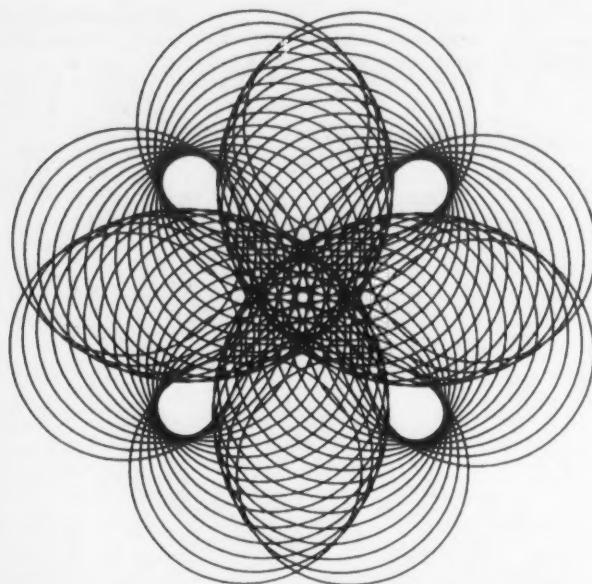
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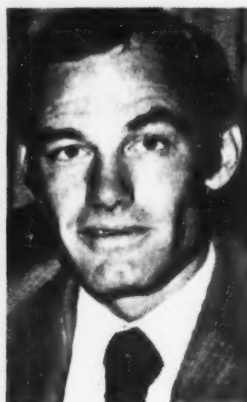
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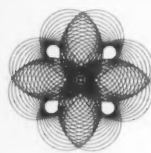
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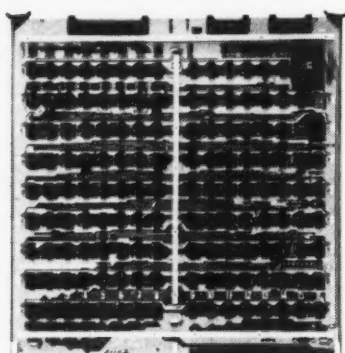
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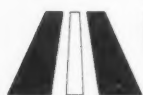


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## Users Briefed on Qualities To Evaluate in OCR Paper

By Frank Vaughan  
CW Staff

SAN DIEGO — Users should assess the mechanical properties of paper used in OCR applications including basis weight, caliper, smoothness, porosity and stiffness, according to Robert R. Green of Moore Business Forms, Inc., who spoke at the winter conference of the OCR Users Association (OCRUA) here.

Green discussed the mechanical properties relating to forms and forms handling in the scanner transport system.

Basis weight is the term used to express the weight of a given size sheet in pounds per ream. Ream size in the U.S. is generally 500 sheets, but the federal government specifies 1,000 sheets per ream. OCR bond papers are normally specified in terms of weight in pounds of 500 17-in. by 22-in. sheets, Green explained.

The industry tolerance of basis weight is plus or minus 5%, so a 20-lb. paper may range from 19 lb to 20 lb. This variance isn't sufficient to adversely affect scanner performance, he claimed.

Caliper is simply the thickness of the sheet of paper, he said. Caliper is usually of little importance in OCR, since most scanners are designed to handle a wide range of forms. Problems do crop up, however, for forms thickness varies considerably and several are intermixed in the same run through the scanner. More than likely, the scanner's input feeder and double document detector can't be adjusted to handle the intermix efficiently. Normally, paper manufacturing tolerance of caliper is plus or minus 5%, which won't cause feeding or scanning problems, according to Green.

### Surface Smoothness

Smoothness of the surface is one of the most significant mechanical properties of the paper, since the ability to be able to print with a minimum of

offsetting and tracking of ink is quite important. The sheet's surface should be rough enough to permit ink absorption so offsetting and tracking can be avoided. If sheets are excessively smooth, it can also affect the print quality of the typewriter, the high-speed line printer and the imprinter. The inks from ribbons and carbons should penetrate paper surfaces; if they don't, images are susceptible to smudging and smearing, he warned.

## CW at OCRUA

Normal OCR paper specification for smoothness is 100- to 200 Sheffield units, named after the instrument that measures this property, he explained.

Porosity can also affect OCR. Some scanners use vacuum pickup mechanisms in the document transport unit. On these systems, porosity is very important. In some cases, documents have been double-fed because the vacuum pickup mechanism penetrated the top document and picked up the second document as well. Normally, only sheets under 24 lb have this type of problem, he cautioned.

Stiffness refers to the amount of sheet stability. Very flimsy paper, if sent through a document transport, would probably jam the transport unit, where a more rigid paper wouldn't. The test for stiffness measures the bending strength the paper can withstand in both directions. The minimum specification for this property varies from 25 milligrams to over 200 milligrams, depending on paper weight and thickness, he said.

All of these characteristics are extremely important because they may affect the quality of printed images, the operating efficiency of the forms press and the optical scanning equipment, he noted.

## Printer/Plotters Unveiled

SANTA CLARA, Calif. — A series of printer/plotters capable of interfacing with video sources that meet RS-170, -330, -343, -375 or -412 specifications have been introduced by Versatec Co.

The 3000 series of printer/plotters offer a choice of resolution (100- or 200 dot/in.), printing speed (500- or 1,000 line/min) and plot speed (1- or 2 in./sec.) and are designed to operate at a 15-degree tilt in any direction, a spokesman said.

All models use 11-in. wide roll paper that is trimmed to the desired length by a programmable cutter and controlled by a differential drive that keeps the paper aligned. Cutter assembly, backplate electrode/writing head, and toner wiper bars/channel are self-aligning, he added.

An Ascii 96-character font set is standard. Scientific/engineering (124 char.) and typesetting (128 char.) styles are available as options, the firm stated. Other options include a differential receiver for output up to 1,000 ft. from the data source and an RS-232 serial input, the firm said.

Prices for the printer/plotters range

from \$8,550 to \$11,400 from the firm at 2805 Bowers Ave., Santa Clara, Calif. 95051.

## Bankers to Hold 'Branch' Meet

PHOENIX — A four-day workshop covering the procedures and concerns of branch operations will be presented here at the Hyatt Regency Hotel beginning April 2.

Sponsored by the American Bankers Association, the workshop will incorporate presentations from industry spokesmen on staffing and scheduling, systems, equipment, profit plans, loss control and branch productivity measurement, a spokesman said. The meeting will also address current events in the legal/legislative and regulatory areas, he stated.

Registration fees for the workshop are \$345 for nonbankers and \$275 for bankers. The association is located at 1120 Connecticut Ave. N.W., Washington, D.C. 20036.

## For Maryland County

# On-Line Unit Handles Building Permit Boom

By Tim Scannell  
CW Staff

ROCKVILLE, Md. — Faced with an increase of almost 100,000 housing units since 1960 and a demand for new construction, Montgomery County's Permits Division, based here, is utilizing a large-scale mainframe to aid in the day-to-day issuance of licenses.

With an IBM 3275 CRT terminal linked to an IBM 370/148 in the Tax Assessment Department, workers can access information within the tax data base. A parcel account number is used as an indirect link to obtain data related to the issuance and finalization of building permits.

Currently, this building file contains 26,500 records, of which 15,000 are active, according to Tom LaFleur, an official in the permits unit.

Permits must be issued for both construction and repairs, a division spokesman explained. A major problem encountered under the previous manual system was the difficulty in providing responses to inquiries about permits and the inability to give accurate statistical reports to the management on outstanding applications, he said.

The reason for this was that a permit was and still is subject to approvals from a multitude of county and bi-county agencies.

After a permit is issued and building has begun, inspections are performed and their results recorded in the appropriate file. Depending on the type of structure involved, there might be 20 building inspections.

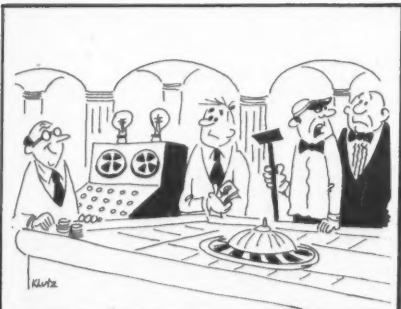
Also involved in the permit process is the numerous statistical reports, one-time reports and comments needed and filed by the various county agencies.

County officials found a central source of information was needed to alleviate the problems caused by such a torrent of information. Because an active tax assessment data base was already operational and contained relatively the same data, they decided to tap it and form a subfile.

### Batch Not Satisfactory

The system at the tax bureau is composed of an IBM 370/148 with 2M bytes of memory. Peripherals include four 3330-11 and two 3333-1 disk drives, four 3420 and one 3411 tape drives, two 1,000 line/min. 1403 printers, a 2450 card reader/punch and a 2671 paper tape reader.

The system was initially designed as a batch operation, but that proved to be unsatisfactory, the spokesman said. It was then that the on-line system was implemented, although statistical reporting is still handled in a batch mode.



'Better Tell the Boss, I Think We've Got Trouble.'

When an application for a building permit is received under the computerized system, the name is matched with the one in the assessment file and the information is extracted from the tax records. A subfile is then formed within the assessment data base to hold data pertaining to the permit and its progress.

The forms containing all the releases necessary for the permit to be issued are then circulated concurrently among the involved agencies. The agencies' dispositions are entered into the data base via terminal.

All of this information can be displayed and is frequently used in answering queries concerning the

status of a permit.

Inspections of the various sites — about 300 each day — are also processed against the outstanding permits and the results are available on the terminal as early as four working hours after the inspectors have returned from the field.

### System Benefits

The entire permit process usually takes four to five months for a single-family dwelling. The building permit itself is retained on-line for about one year; after that it is moved to magnetic tape so the data base is kept to a manageable size.

Benefits of the system have been

most apparent in man-hour savings. Because of the direct inquiry capability, a search through bound listings that normally would have taken hours is now accomplished in about 10 seconds, the spokesman reported.

Permits are now ready for mailing the day after final approval is given, he added, and officials can keep track of the different inspectors and balance the workload more fairly.

But "perhaps even more significant than the time it has saved us is the smoothness of the operation," according to Ralph Graber, chief of the Division of Construction Permits. "We have easy access to data that we simply did not have before."

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# Bank's File System Assesses Loan Risks

Special to CW

SEATTLE — The Seattle First National Bank here is using a file management system to provide custom credit scoring. The scoring ensures that applicants for Mastercharge and Visa are judged under equal standards.

As with most credit-granting institutions, Seattle First had previously assigned loan officers the tasks of assessing credit risks. Those assessments were made on a subjective basis and "human prejudices and personal attitudes" invariably crept into the process, according to Martin Neilson, credit manager.

The scoring system, designed by Faire Isaacs Co., assigns numeric point values to specific items of information supplied by credit applicants and aids the bank in documenting its compliance with federal regulations prohibiting discrimination in the granting of credit.

"More important, by making our credit granting process objective and consistent, the scoring system improves our control over that process," Neilson said. "It enables us, for example, to 'loosen' or 'tighten' our credit approval requirements. That, in turn, can directly affect our profitability."

### Security Problem

Seattle First, however, faced a major security problem in implementing the manual scoring system. "The items on the application form that are assigned weighted point values are not known; neither are the specific number of points assigned to each item of information," Neilson explained. "If those point values were known, the bank would be quite vulnerable to fraud."

The system as designed also did not include provisions for extracting demographic information on applicants, information needed for financial and marketing decisions.

"For those two reasons primarily — the need for security and the need for readily available information — we installed an Inforex, Inc. System 5000 file management system for use in controlling the manual scoring system," Neilson said.

"The items scored and the points assigned to each item would have to have been accessible to each credit scorer," he added. "Now, that information is stored on the System 5000. Data taken directly from the application form is keyed into the system from keyboard/display terminals, and that data includes items which will be scored as well as items being collected for demographic purposes."

"The credit scorer at the Inforex terminal does not know the point values assigned, or even whether an item of information is being scored. In that way, by collecting, say 20 pieces of information and scoring only 8 or 10, we enhance security and also collect the demographic information we need," he continued.

### Instant Approval

Neilson explained that credit scorers enter information from application forms in response to questions which appear on the CRT of System 5000 keyboard display terminals. As items to be scored are entered, the Inforex system calculates the specific number of points to be assigned to each entry. When all required information from the application form has been entered, the system calculates a score for that

application.

"The system allows us to establish high and low cutoff scores, so that any application above a certain total is automatically accepted and any application below a certain score is automatically rejected, Neilson said. This naturally speeds the granting of credit to particularly good risks and also allows us to concentrate our expenses for credit checks on only those applications which should be checked. Before we installed the manual scoring system and the Inforex system, every application had to go through a credit check."

He explained that the credit scoring system developed by Faire Isaacs for Seattle First allows the bank to predict the percentage of applications which will be approved and the percentage which will be rejected.

The Inforex System 5000 has also proven helpful in service to Seattle First 160 branch offices. Previously, according to Neilson, inquiries from branches into the status of individual customer applications required credit department personnel to comb through thousands of paper documents.

"Now, we key in the applicant's name or the number automatically assigned by the system to each application and we can tell the branch whatever the application status is. That improved speed, of course, al-

lows branches to be more responsive to their customers," he said.

### Checks for 'Reasonableness'

Neilson said the manual system ran approximately two weeks prior to installation of the System 5000. Errors resulted from human calculations of each application score, but those errors have been virtually eliminated by the Inforex system.

"One reason for that is a feature of the system called the 'reasonableness' check which, as its name implies, signals the operator whenever information is entered which seems unreasonable. The system asks the operator to recheck that information, then allows a new entry to override the first," Neilson explained.

He added that the Inforex system can prepare a variety of reports for Seattle First credit managers; for example, on the performance of individual loan officers. He estimated that the credit-scoring application uses only about 40% of the system's processing power to handle up to 1,100 entries daily.

"Since we were not on-line to the bank's mainframe, it seemed reasonable to look for a system which could handle not only our immediate needs, but future applications as well. We will automate the assessment of credit lines and also plan to use the System 5000 to batch letters to applicants," he said.

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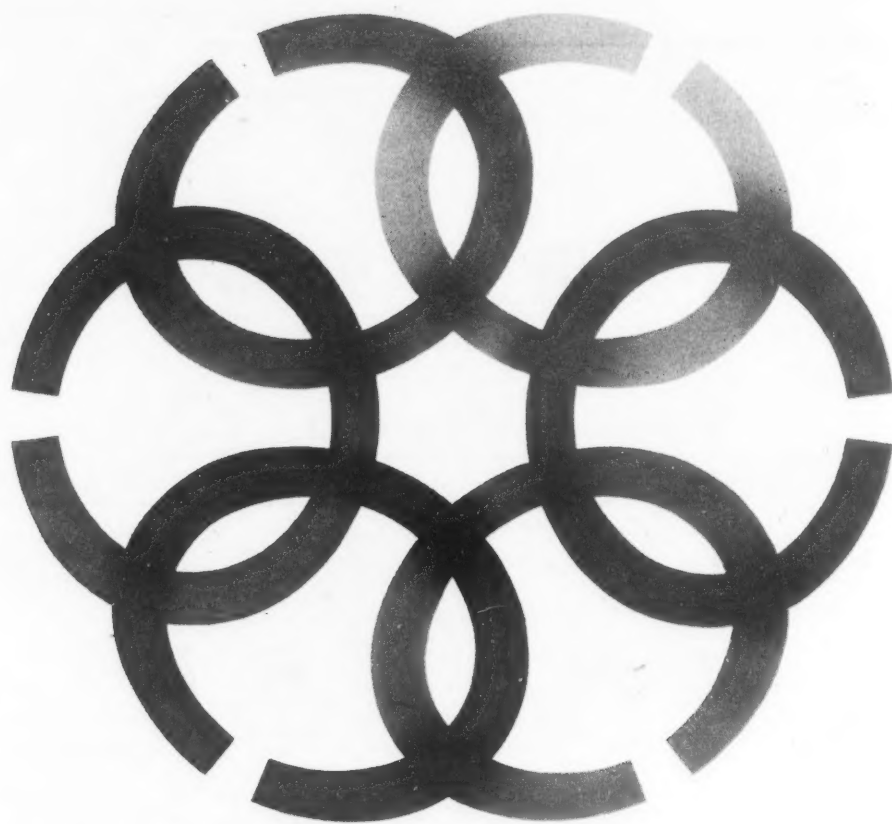
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**A large-scale computer system.**

**Functionally dispersed data processing.**

**A common, integrated data base.**

**Unlimited growth without economic penalty.**



**The ARC<sup>TM</sup> System**  

---

**from Datapoint.**

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to  
work.  
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the  
page.



**Imagine.** A large-scale computer system that would solve all of the problems that system planners have complained about in conventional computer architecture. That would work and grow without interruption, without extensive operator re-training, and without endless new model upgrades. A system that will adapt itself to your budget, and not the other way around.

The Attached Resource Computer™ System is Datapoint Corporation's solution to the inherent problems of conventional computer system architecture. It will eliminate the headaches which until now have seemed inevitable. Like updating several data bases, costly programming changes, and complete system failure. Not to mention the huge expenditures involved in hardware upgrades.

The ARC™ System is an *attached processing* system — based upon the idea of functionally dispersed processing resources, located in a company's offices, stockrooms, transaction counters, and warehouses. Operating independently, and yet as parts of a whole.

Because ARC allows all of these task-oriented processing stations access to the common data base, in as large (or small) a capacity as each company's needs dictate.

#### A unique modular architecture

How can ARC combine the effective throughput of a large traditional computer with the flexibility and convenience of a small computer?

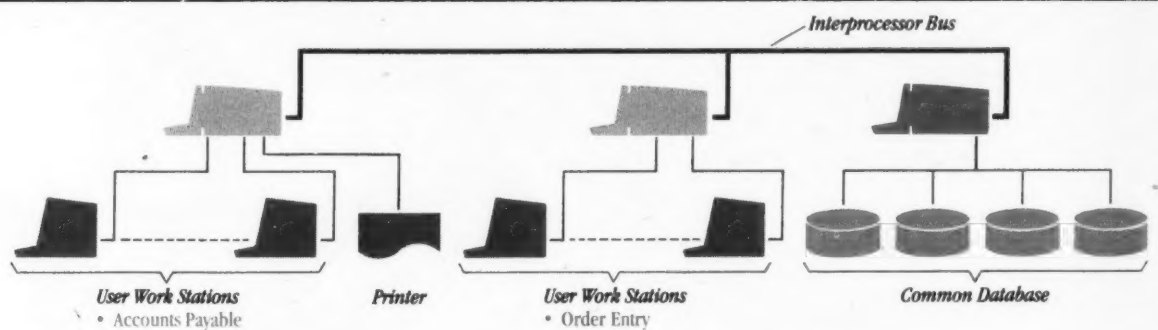
Because it takes the two basic functions of any conventional computer — applications program execution and data file management — and distributes them among two or more specialized computers: the applications processor and the file processor.

By attaching these two types of functionally specialized processors to an ARC System, each company can select just the right amount of processing power and on-line data storage that it needs. Without over-buying to stave off some future requirements. Or over-burdening an existing, insufficient computer.

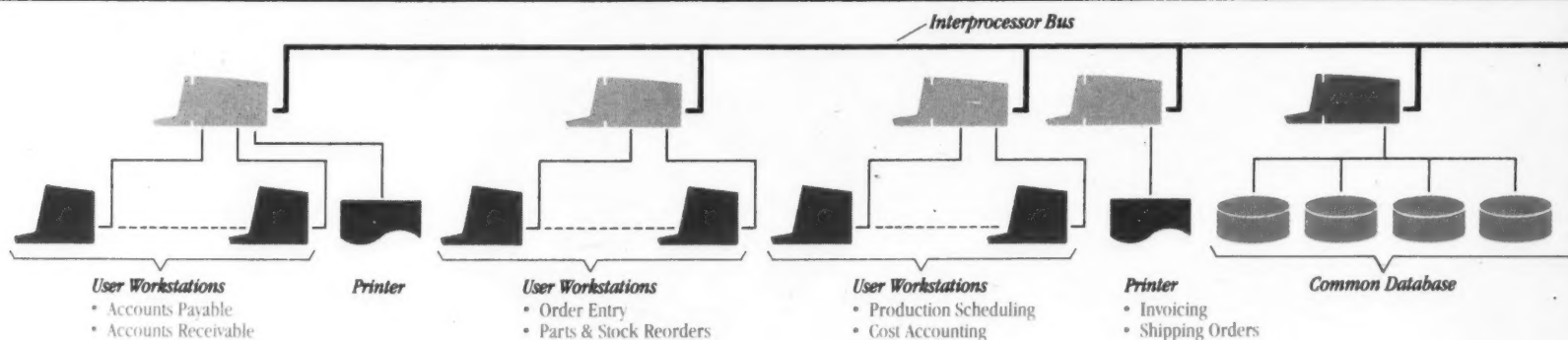
#### Unlimited growth without economic penalty

If more processing muscle becomes necessary as time passes, just add another Datapoint applications processor. Right where the work gets done. And if data

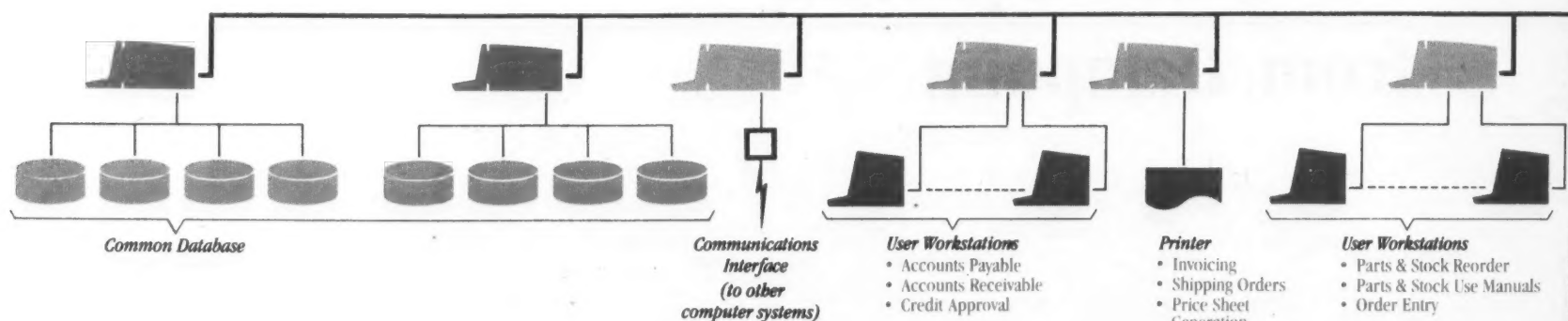
### A small ARC system.



### A medium ARC system.



### A large ARC system.



handling capacity (or speed) needs to be boosted, additional file processors will each provide up to 200 megabytes more disk storage. While preserving the commonality of the data base. And at predictable, economical costs.

Every ARC system comes equipped with user-definable security software that allows each company to restrict access to the data base in several ways.

But the best news is that there is no central processing unit to get bogged down. No single component that will drag the whole system under if it fails. With the Attached Resource Computer, adding (or removing) any attached component requires no system downtime, no re-programming, and no re-training.

#### Functionally dispersed resources

The ARC System uses an electronic pathway called the Interprocessor Bus to communicate requests and data from one attached resource to another. This communication takes place at such high speeds that applications processors can get the data they need faster than if it were on their local disks. Even though the source of the data may be in another department.

Any number of applications and file processors may be connected to the Interprocessor Bus and located in the offices where they're needed. Each applications processor can have the printers, card readers, magnetic tape, or local disk storage that a traditional computer would have. And each applications processor can be dedicated

to its own function, using any of the software in Datapoint's extensive library:

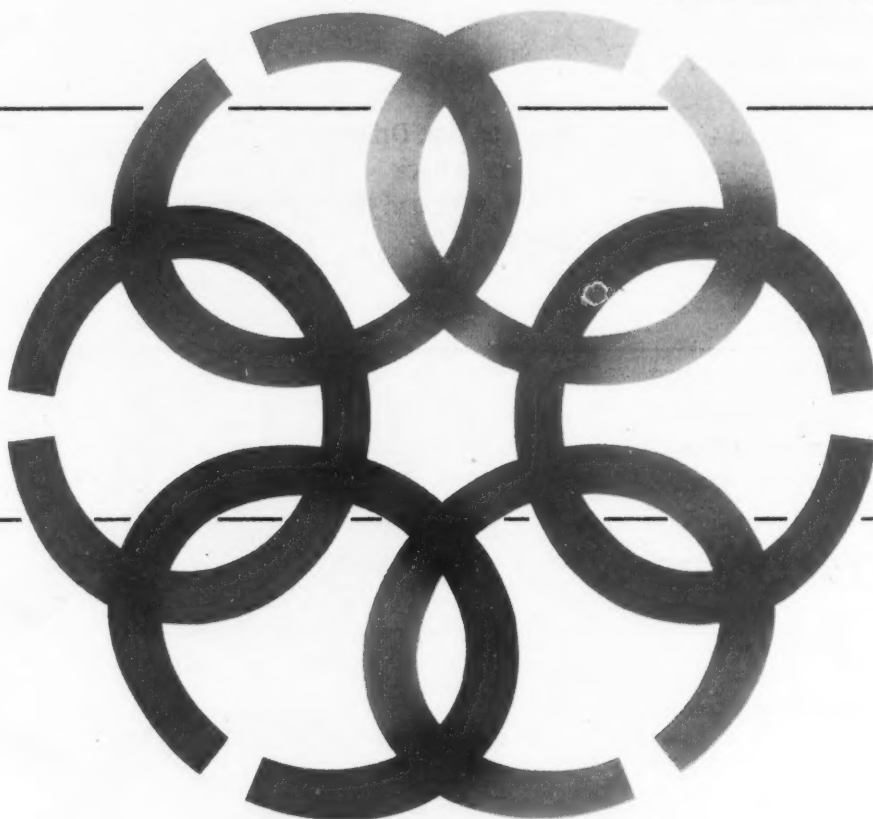
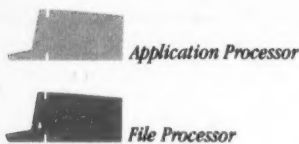
- DATASHARE® for multi-user, on-line transaction processing;
- COBOL for industry-standard batch processing;
- DATABUS®, RPG, SCRIBE®, and BASIC for other business needs;
- Telecommunications to other computer systems with Datapoint's networking software.

In fact, ARC even enables an existing IBM 360/370 mainframe to come on-line as an applications processor, using Datapoint's Direct Channel Interface Option.

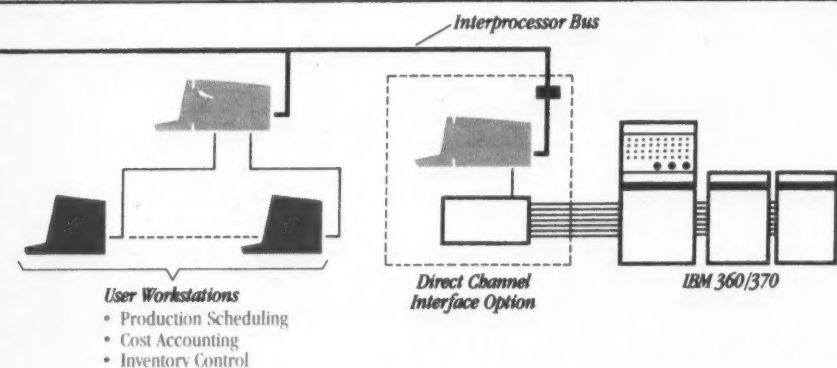
ARC supports all of the functionally dispersed tasks to be carried out at the same time — all on the common data base of the file processors.

#### Use your imagination.

Take a look at some typical ARC Systems. And just imagine how they could be put to work for you.



## The ARC™ System





## ARC™ system components

Datapoint provides you with all the building blocks necessary to construct an Attached Resource Computer™ System to meet your needs.

### Processors



6600 Advanced Business Processor, 120K user memory, supports all Datapoint peripherals and up to 24 user workstations.

5500 Advanced Business Processor, 48K user memory, supports all Datapoint peripherals and up to 16 user workstations.

6000 Series Attached Processors, 60K or 120K user memory, supports all Datapoint peripherals and 16 or 24 user workstations.

3800 Series Attached Processors, 60K and 120K user memory, for single-user data processing, data entry, and telecommunications.

1170 Dispersed Processor, 48K user memory, supports Datapoint peripherals and up to 4 user workstations.

1150 Dispersed Processor, 24K user memory, supports all Datapoint peripherals.

### Peripherals



#### Disks:

25MB Mass Storage Disk drive, up to 200MB per processor as a local or common database

20MB Cartridge Disk drive, up to 160MB per processor as a local or common database

5MB Cartridge Disk drive, up to 40MB per processor as a local database



#### Printers:

30 cps Servo printer

80 or 160 cps Freedom Printer

120 LPM printer

240 LPM printer

300/600 LPM printers



#### Magnetic Tape Drives:

7 and 9 track

556, 800, and 1600 bpi recording densities

### Software:

COBOL: industry standard business programming language

BASIC: general purpose business programming language

RPG: report-oriented business programming language

DATABUS/DATASHARE®: Datapoint's high-level business programming language for single or multiple users

DATAFORM/MULTIFORM®: Datapoint's two-level data entry and checking language

DOS: powerful operating system with comprehensive utilities

SCRIBE®: Datapoint's powerful yet easy-to-use text processing language

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Communications: IBM, Honeywell, Burroughs, Univac, and other disciplines

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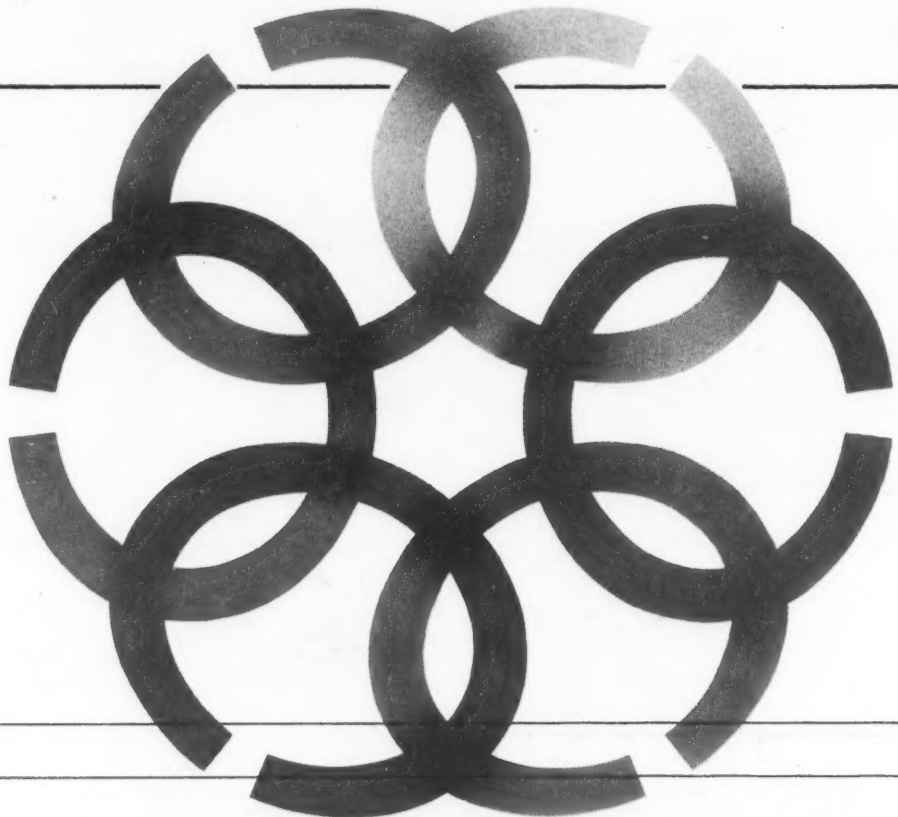
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## Establish DP Cooperative

# Working Together, Counties Cut Costs

By Ann Dooley  
CW Staff

ST. CLOUD, Minn. — Unable to afford computer services by themselves, 19 Minnesota counties banded together and formed a computer cooperative that saves them money and the time involved in performing the tasks manually.

The Minnesota Counties Computer Cooperative, established three years ago, uses Burroughs B700 or B800 minicomputers in each of the counties for real estate tax billing purposes.

Although all the DP work is done at each site, none of the counties has a regular DP staff. The programming, maintenance and training is provided by Computer Concepts and Services, Inc. here.

The counties split the cost of using the

software service company's staff by dividing the cooperative's bill into "fair shares" according to the amount of service used by each county.

The idea for a cooperative originated when five counties which had purchased the same type of hardware independently of each other discovered they were using the same software firm for the same type of application. They realized a system of cooperation might be preferable, according to Tom Hennen, Scott County auditor, so they could "share the problems as well as the solutions."

The counties also share the software provided by Computer Concepts; they therefore don't have to spend money on salaries for a DP staff, he said.

The counties pay only for the service they get on a monthly retainer fee, Hennen said. The software vendor also provides a software and hardware backup for each county, he noted.

The hardware configuration and service team for each county varies according to its

size and needs. But the application programming used is similar for all the counties.

For example, one system in a county might handle information on 7,000 parcels of land for real estate tax purposes and another system might handle 50,000 parcels, according to Monte Westphal, Computer Concepts project manager.

Most of the counties were on manual systems before joining the cooperative. It takes two to five months to convert a county's operations to a computer, Westphal said.

Input methods differ depending on an individual county's needs, he noted. Some counties enter information on a keyboard, others by punch card or direct data entry.

Once the procedure is past the input stage, however, everything becomes more standardized. Computer Concepts provides a staff of nine programmers to service and backup the counties.

Although the major application for each county is real estate tax billing, some are considering computerizing their voter reg-

(Continued on Page 52)

## DEC Unveils 308 With One Terminal

MAYNARD, Mass. — A small business system designed for firms which require the use of only one terminal is available from Digital Equipment Corp.

The unit, which operates on ordinary current, includes the company's VT-78 processor CRT and memory combination. Dubbed the Datasystem 308, it can handle business applications such as order processing, invoicing, inventory control, accounts receivable/payable and payroll, DEC said.

A software package for word-processing applications is optional, a spokesman added.

Two line printers are available for the system, the LA78 serial line printer with an 180 char./sec speed and the LQP78, a 132-column, 96-character letter-quality printer.

The Datasystem 308 runs under DEC's COS-310 operating system and uses Dibol, DEC's business-oriented language. Programs are transferable to other systems, the spokesman noted.

The system features self-diagnostic capability and single-button program load. Activated by a start switch, the 308 checks itself to ensure proper operation and pinpoints problem areas, the spokesman claimed.

Prices for the 308 range from \$10,600 for a system without software support to \$18,000 for a completely configured system. A low-end 308 with the VT-78 processor, CRT and 32K bytes of memory, automatic program load, dual diskette drive, desk, operating system and two training credits costs \$12,600, DEC said from its headquarters here in Maynard, Mass. 01754.

## Talking to Mini Makers — Part 3

# Vendors Point to Rapid Growth As Cause of Service Problem

By Esther Surden  
CW Staff

Users have two gripes about the service people who vendors send out to fix hardware or isolate software bugs: they're either ill-trained or spread so thin that a different person shows up each time.

That's what users told *Computerworld*, and CW asked a random sampling of vendors to address the problem.

According to a spokesman for Data General Corp., the problem stems from coping with a 50% growth rate every year. Every manufacturer facing rapid growth has trouble getting enough trained people to serve the products in the field, he indicated.

DG provides a 13-week training program for its software people "with a good part in the local office using self-study programs" to bring them up to a base level of proficiency, he stated.

Hardware people at DG go through an "intensive" training program lasting 12 weeks, he said, adding the program is being continually strengthened.

Computer Automation, Inc.'s end-user Commercial Systems Division believes it has avoided the problem of "spreading the field force too thin ... because we only have two possible configurations" and 90% of the

components making up both systems are the same.

This contributes to a service organization that knows its systems very well, a spokesman there said.

Datapoint Corp. is trying a system of assigned territories for software support. Particular service people are assigned particular

In July, *Computerworld* asked readers to tell us what they thought about minicomputers by filling out and returning a survey form. The results of that survey, published in August and September issues, showed support and maintenance were areas of great concern to users.

This is the third article in a series that will fill users in on what vendors say they are doing to alleviate some of the problems in those areas.

territories backed up by people assigned to pick up a service call if the regular service person cannot. That way, "one person has primary responsibility to those users in his territory," a spokesman pointed out.

"We are also establishing a skills index to

(Continued on Page 52)

MINI WORLD

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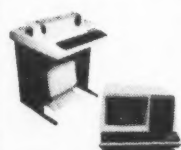


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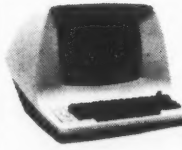
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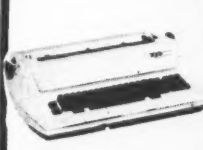
DEC LA-36/LS-120  
LA-180/VT-52



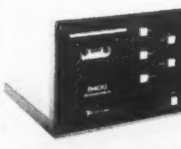
T.I. 745/743/733/765  
Bubble Memory



Lear Siegler  
ADM 1A/2/3A/400



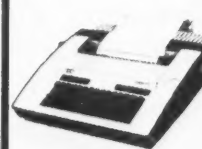
Diablo 1620/1640  
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## Conference to Cover Trends

MENLO PARK, Calif. — A conference on "The Small Computer Industry 1978-1980: Key Issues Facing Suppliers, Users and Investors" will be presented by Dataquest Inc., at the Orlando (Fla.) Hyatt House March 5-7.

Speakers will cover issues including communications trends and their potential impact on small computers, future semiconductor technology directions and its impact on the computer industry, trends in network architecture and the evolution of the programmable desktop calculator into a small business computer.

### Selection Panel

The relationship between small business computer manufacturers and their dealers and distributors will also

be covered, according to a spokesman.

A panel of users will discuss "Why We Selected the IBM Series/1." The discussion will cover the selection process, advantages of the mini over competitive offerings and how well it fulfilled expectations, Dataquest noted.

Dataquest can be reached at 3000 Sand Hill Road, Menlo Park, Calif. 94025.

## Counties Form DP Co-op to Cut Costs

(Continued from Page 51)

istration or county personnel files.

"The system is basically unlimited and the flexibility is definitely there," Hennen said. But participation in a new application should be weighed by each county.

A county could go into an application completely on its own, but it would have to shoulder the entire cost instead of sharing the expense with other counties, he pointed out.

Scott County, located 20 miles south of Minneapolis, enters its real estate

tached before running. The controller is said to be transparent to the host unit and compatible with diagnostics, drivers and operating systems written for it.

The 017 interface option costs \$1,150. HI is at One Houston Sq., Austin, Texas 78753.

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Here's a *tailor-made* system to fit the requirements of your job today. In addition, BRAEGEN's multi-tasking intelligent controller offers the flexibility you will require in the future. **Systems Programmers**, in particular, find the following features very valuable.

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**BRAEGEN**

## HI Printers, LSI-11 Linked

AUSTIN, Texas — Users can now interface the Houston Instrument (HI) 8200 series printers to Digital Equipment Corp.'s LSI-11 micro-computer by using the printer firm's 017 option, according to a spokesman.

The controller plugs into the LSI-11 bus and a printer cable is at-

tax billing data by keypunch. The information entered includes the number of the parcel of land, the owner's name, the estimated and limited market value and the legal description.

The system is programmed to determine the mil rate — the rate upon which the real estate taxes are based. Once that figure is determined, an automated tax statement is prepared and mailed out.

The computer breaks down the tax statement by indicating how much of the tax dollar goes to what, such as schools, city and any other special assessment.

## Growth at Crux Of Service Woes

(Continued from Page 51)

determine the training and technical education of each person to make sure they are each adequately trained," the Datapoint spokesman noted. Training is developing a "symptom and solution" approach, he noted.

Another vendor asked to respond to the problem said it is beefing up its training program. Basic/Four Corp.'s management commitment has been in the training of system support personnel, a spokesman said.

"The next thing we need to do is the same [training] with vendors and dealers," he added.

Recognizing the difficulty in providing good service, a spokesman for General Automation, Inc. said his firm has an attrition rate of less than 13%, but "growth swells the ranks." The user has to ask himself, "Do I want the same person back, or do I want my problem fixed?" he said.

GA is "supporting over 300 different products" and still has to train its people on older product lines, adding to the problem, he indicated.

On software problems, Digital Equipment Corp. said it is more valuable to the user to have "someone familiar with our product there sooner than to have someone who is familiar with his particular installation there later.

Hewlett-Packard Co.'s customer engineers are assigned by account, allowing an engineer to establish a relationship with the systems manager, a spokesman for that company said. The HP workers are even outfitted with beepers so they can be reached if they are not in the office if a call from the user comes in, he said.

HP has two levels of training for its customer engineers, a basic training course of 16 weeks for those who install the systems, maintain them and run diagnostics, and a more specialized course lasting six weeks for operation software specialists, CPU hardware specialists and peripheral specialists.



# Software Seen Problem for Small Businesses

By Esther Surden  
CW Staff

ANAHEIM, Calif. — Since hardware costs keep coming down, software remains the major bottleneck in bringing small business system prices low enough to appeal to most small business people, two panel members at a recent conference here agreed.

And price isn't the only reason some users will not consider a small system. Another reason is that customized software takes control of the business out of the hands of the person who built it and puts it into the hands of DPers.

Speaking at a session on small business systems, Charles G. Milden, president of Interactive Computer Systems, Inc., and Charles G. Muhle, director of marketing support for Basic/Four Corp., told about 200 attendees that the development of standardized, parameterized applications packages could help decongest that bottleneck by reducing costs and putting control back in the hands of the user.

## The Ground Up

Muhle pointed out that the typical small business person is someone who has built a business up from the ground, is in touch with his business and has survived to this point without a computer. He's heard some horror stories about them and thinks that in order to have one he must invest in a DP staff. In addition, the small business person has a hard time putting trust in a machine.

The vendor, on the other hand, would like to put in a system that is easy to service, so as to cut down on overhead costs, installs quickly and doesn't require much support.

The vendor and the user's interest merge, because the same solution that will provide a good system for the small business person will also be more easily supported, Muhle indicated. That solution is a software product that is both "horizontal and vertical in its appeal." Such a product would draw on classic accounting programs which, through "yes, no" parameters and set user choices, could address many different industries.

## Printer Added For PDP-11s

MAYNARD, Mass. — Digital Equipment Corp. has a line printer with both plot and character printing capabilities designed to work with the firm's PDP-11 minicomputers.

The LXY11 printer, which outputs at 300 line/min for characters and 170 line/min for plots, can produce both double- and single-height characters in the full Ascii 96-character set, a spokesman said. Underlining capability is also available.

The plotting feature uses the PLXY-11M software package, a library of Fortran callable routines, and is supported by the RSX-11M operating system. Character and plot generation by impact allows multicopy forms to be used with the device.

The LXY11 costs \$14,400 including the software from DEC, which is headquartered in Maynard, Mass. 01754.

Such software does not put the control of the business into the hands of a third-party expert, but leaves it in the hands of someone who knows the business, he said.

## Over-Extended Software Firms

Not only the problem of the user and the vendor can be solved by using parameterized software, but the problem of the over-extended systems software house can be alleviated, Milden pointed out. In the past there have been more machines to install than qualified people to help install them and anyone with a business card could be a software house, he asserted. But smaller software houses were consumed by their user base — that is, they spent all of their time on support

and little on new installations.

The problem, he said, was that the only person who could support custom software was the person who wrote that software. Flexible, standardized software was needed to prevent this from happening, he said.

It would prevent any user from becoming an island because no one will support software installed by someone else. If the basic modules are the same, it will become easy to support that software.

Parameter-driven software also allows the user to change the software to suit his business. The modules used, of course, should be based on sound accounting principles so that the user does not need to develop a new accounting procedure to do his work, he

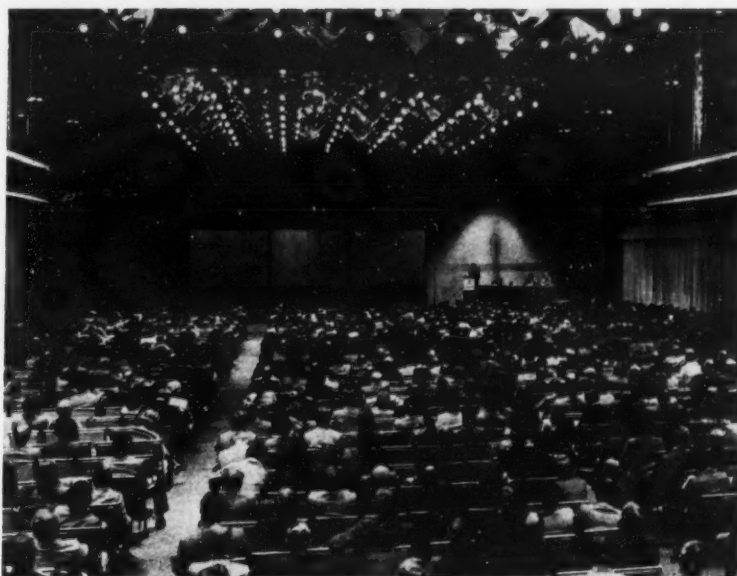
added.

An example of parameterized software would be a package that uses the word "product." Used by a wholesaler, that word becomes "style" throughout. For an auto parts manufacturer, it would become "part." With such a package, modules could be added or deleted depending on the business so that if characteristics of a part had to be detailed, for example, they could be.

Support will be simplified because a programmer will not have to learn the styles of several different analysts.

Soon this software will be produced through "dialogue with a computer," which will in effect produce the software package tailored to the user's problems," he predicted.

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# Firm 'Burns Up' Paperwork With Large Mini

BUFFALO, N.Y. — The installation of a large-scale minicomputer at the National Fire Adjustment Co., Inc. (NFA) here has helped stoke the firm's growth and rescue the company from a bottleneck created by manual procedures, according to the company's president.

NFA is a "public adjustment firm" that provides services to its clients in the event of a fire, Frank R. Papa explained. After a fire hits, NFA reviews a client's insurance policy to determine the scope of his coverage, sends an estimator to itemize losses and damages, prepares the claim to be submitted to the insurance company, reviews the claim with the insurance company's adjuster and handles negotiations for its client.

Before installing the minicomputer, all of these services were handled manually. After a client's insurance coverage was analyzed, an NFA estimator would go to the fire site and make notes detailing the damage.

An "extender" then made calculations to convert the rough notes into

dollars and cents — for example, so many board feet of lumber at so much per board foot or so many square feet of finish plastering at so much per square foot. Extenders had to know hundreds of prices for building materials and labor.

The extender's notes were then typed, leaving room for error in the translation of handwriting. The finished data required detailed error-checking.

## Floods Spark System

New business that came after NFA began handling insurance claims for floods in western New York State provided the impetus to try a new system. The company hired Charles DeWald, a consultant with Custom Computerization, Inc. here, because NFA knew of other firms he had helped.

Custom Computerization developed a two-dimensional organization of building trade items and services and also developed a standard language to help estimators describe construction or repair details. The system was de-



Frank R. Papa gets a lesson on the operation of NFA's mini from Charles G. DeWald.

signed in Fortran for a commercial time-sharing house first and then moved in-house to the minicomputer.

A data collection form was designed to ease the estimator's writing burden. This form is important because estimators work under adverse conditions in damaged buildings and in all types of weather, DeWald said.

The organization also included two other elements: a simplified scheme for the typists who put the information in the computer and a systematic means to check input data for errors and omissions before a claim is generated, he noted.

NFA had to establish separate pricing for each city, and the system had to allow material prices in the computer to be updated or overridden. Matching and material loss had to be computed and noted as part of the description in the claims.

The system also had to include an insurance recapitulation, note variations in the grades of materials and associated pricing where appropriate and be flexible enough to accept any aspect of loss that NFA could encounter, DeWald emphasized.

Because each description that appears on the claim must be complete in every relevant detail, estimators needed to be able to add comment lines anywhere in the claim.

When the firm decided to move to an in-house system, it established several

criteria. For one, the computer would have to support the claims-generating process in a time-sharing mode while simultaneously allowing NFA to develop and operate a conversational management information system.

NFA decided on Prime 400 time-sharing system after analyzing the mini and mid-size computer systems available. "The references of companies using Prime equipment were very positive," DeWald said.

## Overnight Automation

NFA's operations became automated overnight, DeWald recalled. "Training the estimators to use the language and coding sheets required only a three-hour session," he said.

"The estimator group manager said, several months after the system had been in use, that it was reducing the site time required to list damage by 25% to 40%. The estimators generally agree that the computerized system makes their job easier."

The system has reduced by approximately 4 to 1 the number of typists required to produce the same number of claims, he added. But its most significant benefit is the dramatic reduction in time it takes to prepare a claim.

When NFA used manual method, it took several days to prepare a claim from the estimator's notes. Now, DeWald said, an average claim takes 30 to 45 minutes to complete.

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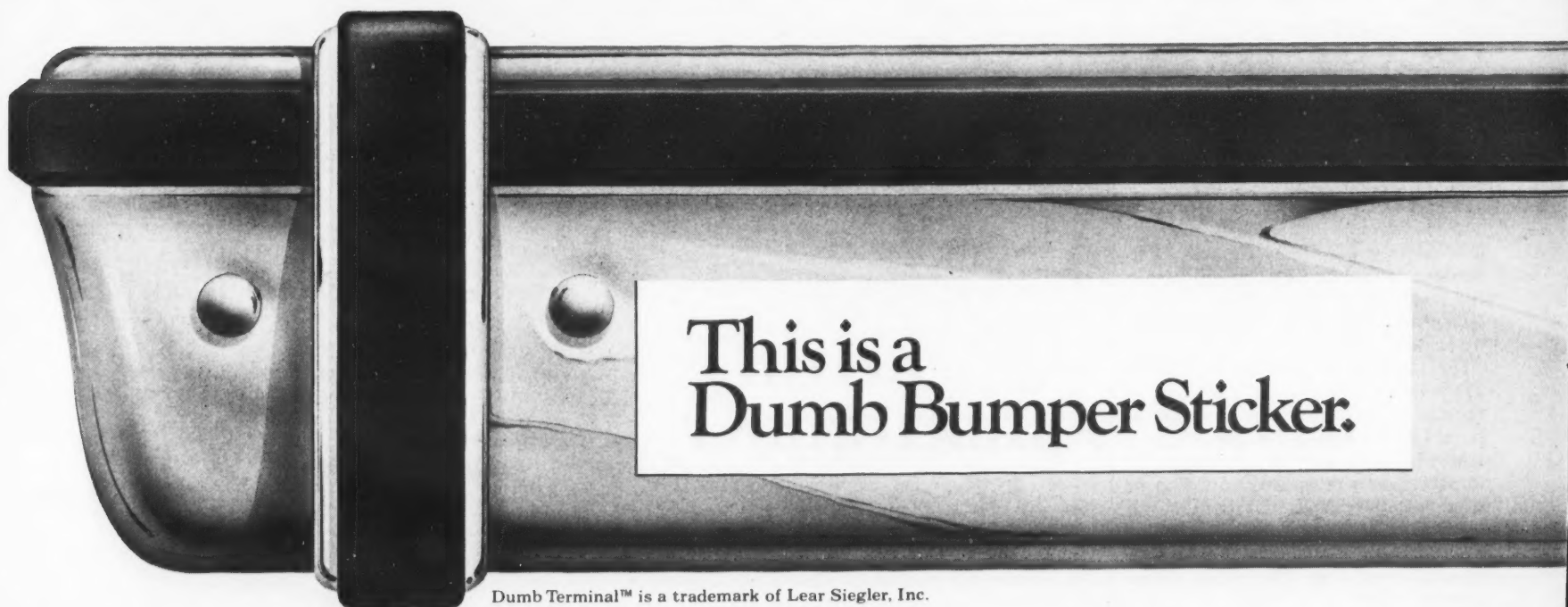
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## Eliminate Tedious Manual Tasks Small Systems Check Out at Inns' Front Desks

CLAREMONT, Calif. — The lodging business is not a place for amateurs, in the opinion of Robert S. Sanford, general manager of the Services Division of Griswold's, a growing Southern California hospitality enterprise.

"Management has become more and more professional, particularly with regard to properties in the 150- to 300-room category, where operators are finding they can make money if they know how to run the business properly," Sanford said.

Griswold's is an example of how small-to-medium-sized properties can benefit by using small computers with programs designed to handle hotel control, accounting and reporting applications.

### Uses Three Systems

Two years ago an IBM System/32 was installed at the front desk in the company's 188-room Griswold's Inn here. Another System/32 has since been placed in a 265-room property which Griswold's opened recently in nearby Fullerton.

Using a program designed by Sanford and his staff, the two systems have eliminated the many tedious manual chores previously involved in front-office operations, Sanford said. In addition, a third System/32 is used at Claremont for back-office accounting for both hotels, as well as for general accounting for the company's other enterprises.

Despite an increased workload brought on by steady expansion, the systems have made it possible for Griswold's to maintain a consistently high standard of guest service without increasing the size of its front-office and accounting department staff, according to Sanford.

Moreover, he added, efficiency in reservation control has helped keep occupancy levels well above 90% year-round without overbooking.

### Deciding Factor

Griswold's turned to IBM for its small systems because it felt it needed around-the-clock maintenance service. People don't check in and out of a

hotel between set hours, Sanford noted.

At first the company got a System/3 Model 6 and considered upgrading to the Model 8. Instead, he said, it went to two System/32s, which turned out to be an economical solution.

When the 3/6 went into operation in 1972, Griswold's had 350 employees, processed about 4,000 invoices in payables each month and had seven profit centers.

The operation now has over 750 employees, about 12,000 payables transactions a month and 28 profit centers.

"Since Griswold's Inn is a destination-type hotel with about 80% of its income derived from corporate business, we have to be extremely accurate in our reservation counts, particularly since our policy is to find and pay for a guest's lodging elsewhere in case of an overbooking," Sanford said.

"This, plus the need for closer control of room inventory and guest accounting, led us to decide on a separate, small computer dedicated to front-office operations.

"We selected the System/32 for several reasons," he noted. "First, its compactness makes it ideal for front-desk installation. But, despite its small size, the System/32 has about twice the power of our previous computer at about half the price."

### Software Now IUP

The hotel front-office management system developed by Griswold's is now available to other companies in the lodging industry as an IBM Installed User Program (IUP) for the System/32. The IUP covers all of the traditional front-office functions including reservations, registration/check-in, guest accounting/check-out, housekeeping, room status, preparation of telephone lists, travel agency accounting, guest history, shift and night audit, city ledger and management reporting/sales analysis.

The program prompts the user through all functional procedures a step at a time. As the operator enters data to make a reservation, register a guest, post charges or print a folio, instructions on the computer's CRT

screen indicate the next step in the transaction.

"The key to efficiency in the system is one-time entry of data which can be reused as often as necessary for the various accounting and reporting functions associated with front office operations," Sanford pointed out. "For example, when we enter a reservation we provide the system with the guest's name, address, city, state, Zip Code, company or group affiliation, arrival and departure dates, type of room desired, special requests and, where applicable, travel agency information."

"The program assigns an account number for the reservation, and thereafter the same information is used repeatedly."

"First it is used for automatic generation of a confirmation and deposit request, next for production of an arrival list and the registration card (which is

printed in advance of the guest's arrival to facilitate rapid check-in), then to provide the basic information for printing the folio and for production of telephone lists, and room status worksheets.

The program also automatically posts advance deposits directly to the guest's folio, eliminating the need to transfer this data from a monthly folio.

Individual guest charges are the only additional information required for the folio, and these are entered via the System/32 keyboard as they are received, along with a code identifying the type of charge.

The system posts the room charge and tax to the account each night and prints the folios for those guests who are scheduled to checkout the following day. If additional charges are incurred after the folio is produced, these can be posted at checkout time and a new folio printed.

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The Dumb Terminal. Without thinking, it started a movement.





## Floppy Has Four Heads

W. LOS ANGELES — A dual-headed, dual-diskette drive that reportedly reads and writes on both sides of two 8-in. floppy disks is being offered by Persci, Inc.

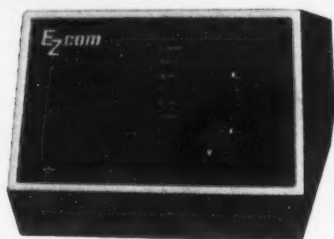
The drive, which stores up to 3.2M bytes of data in the space required by a standard size floppy drive, was designed for both minicomputers and microcomputers based on 8080, 6800 and Z-80 systems, Persci said.

Data can be encoded in single or double density in IBM-compatible soft-sectored formats or expanded hard- and soft-sectored formats on IBM Diskette I-, II-, or IID-compatible media, according to a spokesman.

The drive will store up to 1M byte of data in IBM-type format, 1.6M bytes in unformatted single density.

The drive features an average seek time of 33 msec. It costs \$1,595 from Persci, 12210 Nebraska Ave., W. Los Angeles, Calif. 90025.

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**Also Crown's CCI-5000.** For those who need a cassette device Crown offers CCI-5000, with many of the advanced advantages of EZ Com in cassette form.

## Pertec Builds Business Systems Around Mits/Altair 8800B Micro

WOODLAND HILLS, Calif. — Pertec Computer Corp.'s Microsystems Division has introduced a microcomputer-based integrated business system called the Mits 300.

The Mits 300 is a complete hardware and software system. It is available in two configurations, the hard-disk Mits 300/55 and the floppy disk 300/25.

### Word Processing

Both provide capabilities for word processing, inventory control and accounting functions including general ledger, accounts payable, accounts receivable and payroll, according to the vendor.

### From Datapoint

## Freedom Printer 160 Char./Sec

SAN ANTONIO, Texas — Datapoint Corp.'s Freedom printer, designed for the distributed processing environment, is now available in two 160 char./sec versions.

The Model 9236 was designed as a system printer for any Datapoint business system producing parallel data output. It is compatible with existing system line printers and uses address and control code sequences which are identical to the 80 char./sec parallel data version, the Model 9232, the firm said.

The Model 9235 accepts serial data and is intended for use as a terminal printer on Datapoint's Datashare business time-sharing systems. It functions as a receive-only terminal or can be connected to CRT terminals for hard-copy output, Datapoint said.

### Uses Cartridge Ribbon

Both printers incorporate a cartridge ribbon and use a 5 by 7 dot matrix to impact print a full 96-character set with upper and lower cases. Up to 132 columns may be printed

Each configuration is comprised of a mainframe, a CRT terminal on a desk and a printer on a pedestal.

The Mits 300/55 incorporates a Mits/Altair 8800B turnkey mainframe with 64K of dynamic random-access memory, 1K of programmable read-only memory and serial I/O interface.

It also has a Mits/Altair B-100 CRT terminal with a 12-in., nonglare monitor, formatted to display 24 lines of 80 char./line with a memory page of 1,920 characters, the firm stated. Its printer is a bidirectional Mits/Altair C-700 that can print 60

char./sec with 26 line/min.

The system also includes a hard disk and controller and, Basic language software.

The Mits 300/25, also for accounting applications, is identical except that it includes two floppy disks.

### Inventory Package Available

An inventory management software package is available for the accounting system. The Mits/55 is priced at \$15,950 and the Mits/25 costs \$11,450. The accounting package costs \$4,000. Pertec Computer Corp.'s Microsystems Division is at 21111 Erwin St., Woodland Hills, Calif. 91367.

on standard sprocket-fed paper, a spokesman noted.

The tractors may be adjusted to suit paper as narrow as 1.5 in, he added. Up to six-part forms may be used.

The Model 9235 serial printer costs \$4,540 and leases for \$185/mo on a two-year lease with maintenance included. The Model 9236 parallel

printer can be purchased for \$5,540 or leased for \$215/mo on a two-year lease with maintenance.

A dual tractor option is available on either version for \$500 or \$26/mo on the two-year lease with maintenance, the company said from 9725 Datapoint Drive, San Antonio, Texas 78284.

## Canadian Vendor Designs Manufacturer's Turnkeys

OTTAWA — Katcard Systems Ltd. has an on-line system for manufacturers based on General Automation, Inc. minicomputers.

The turnkey system includes software for inventory accounting, order entry, shipping and invoicing, backlog reporting and work-in-progress for production with bill-of-materials and full accounting.

The bill-of-materials system features an explosion prescan, allowing the user to see what materials are needed for items currently in production and which parts are on hand, as

well as their quantity, a spokesman explained.

Subcomponent breakdown is also accommodated.

A small system based on the GA 440DS with 128K bytes of memory includes 10M bytes of disk, an 800 bit/in. tape drive, a 400 card/min card reader, one 200 line/min printer, a 4-line controller and four terminals. It costs \$104,000.

Prices range upward to \$172,000 depending on configuration, the company said from Suite 306, 376 Churchill Ave., Ottawa, Ont. K1Z 5C3, Canada.

## Industrial Control Backed

MAYNARD, Mass. — Digital Equipment Corp. has introduced a system for dedicated industrial process monitoring and control based on its LSI-II microcomputer.

The IP300 was designed to bring fully programmable process I/O to localized applications, the firm said. It

handles up to 78 I/O modules.

With 56K bytes of MOS memory, dual flexible disk unit, Decwriter II console terminal, RSX-11S real-time operating system and space for up to eight I/O modules, the IP300 is priced at \$17,450, DEC said from its headquarters in Maynard, Mass. 01754.

## Floppy Stand Revolves

COMMACK, N.Y. — The Floppy Merry-go-Round from the Data Products Division of Robins Industries Corp. is an integral stand that revolves on a ball-bearing

track.

The unit holds 64 diskettes (two in each pocket). Its cost is \$110 from the vendor at 75 Austin Blvd., Commack, N.Y. 11725.

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## Looking for a Micro Second User's Search Ends Differently

By Jan A. Heise  
Special to CW

There are many people who have been faced with difficult decisions when purchasing microcomputers. Like William Colsher, I, too, sent for literature from all of the manufacturers.

In the course of my search, I considered a few more systems than Colsher did — the Cromemco (Z-80), Vector (8080), Polymorphic Systems, Inc. (8080) and Processor Technology (8080) systems.

I also thought about building a unit from scratch by ordering an S-100 bus motherboard and 8080 or Z-80 microprocessor board from various companies.

In addition, I visited computer stores and other computer hobbyists for actual demonstrations of the various systems and a chance to grab some hands-on experience. This included a Digital Group system.

I came very close to ordering a system similar to Colsher's, but instead I bought the Imsai Manufacturing Corp. 8080 system.

To me, the advantages of having a machine with an Altair S-100-compatible bus a heavy-duty power supply and, in my case, front-panel switches for development work far outweighed the initial savings which Colsher claimed he gained with his system.

The primary reason I decided on the Imsai system was that the S-100 bus has become the de facto standard bus for microcomputers. There are currently dozens of manufacturers making S-100-compatible components.

On the other hand, purchasing the Digital Group system virtually locks one into the products from that company. People buying the Heathkit, Radio Shack and Commodore units will also face this problem.

If one is willing to accept the fact that he will probably have to be content with the products produced by that manufacturer, then there is no problem. As sales increase, other manufacturers may start making boards for these computers.

It is not that I don't like Digital Group products, but I wanted the versatility offered by the S-100 bus. For example, I have a friend who just upgraded his Imsai to a

Z-80. He made a toll-free call to S.D. Sales in Dallas, purchased a Z-80 board for \$139 and was running it in his system a week later.

I currently have boards in my system from five different manufacturers, and I have encountered no problems with any of them. One philosophy which I followed when

*The search for a microcomputer system can be a complex undertaking. William L. Colsher recently discussed how he decided to acquire a Z-80-based system [CW, Dec. 5]; in this issue, another user tells how he reached a totally different decision while engaged in a similar search.*

purchasing my components was not to buy any boards that I had not actually seen or that were not being used and recommended by hobbyists I knew.

The \$675 for the four-board system which Colsher described should not really be compared with one of the complete kits. A more appropriate comparison would be the complete Digital Group system with cabinet and power supply at \$895 plus \$40 for the heavier 18A supply, a total of \$945.

The purchaser must decide if he wants his computer mounted on a piece of plywood and sitting exposed on a workbench or whether he wants a compact unit that can be taken to the office or classroom, as I do with

mine.

With a curious two-year-old son in my home, the exposed component approach was not acceptable to me.

Colsher chose the \$200 8K memory option, which means he did not select the Digital Group low-power, high-speed memory option to take advantage of the possible increased Z-80 speed. That option is \$250 for the 8K.

Neither of these is a real bargain. I paid \$170 each for high-quality 8K memory kits six months ago and Godbout Electronics is currently selling 8K random-access memory (RAM) kits at \$130 each or four for \$475. S.D. Sales has assembled and tested 8K RAM boards for \$160. These are all high-quality components and this is what competition is doing for the S-100 bus owner.

Colsher was mistaken in his reference to the "tarbell/KC standard." The Tarbell tape interface (which I am using) is a high-speed tape interface. The Tarbell standard is approximately 1,500 bit/sec or 187 byte/sec.

This is over six times faster than the Kansas City standard and one and one-half times faster than the Digital Group tape interface Colsher is using. An advantage of the Tarbell interface is that even though it is very fast, the phase-encoded self-clocking method allows use of an inexpensive recorder, such as my \$35 Panasonic.

I agree with Colsher that Digital Group appears to have put effort into producing a lot

(Continued on Page 58)

## Personal System From Umtech Includes Library of Programs

SUNNYVALE, Calif. — Umtech has introduced a personal computer with a pre-programmed library of educational, home management and entertainment programs.

The Videobrain contains an 8-bit Fairchild Camera and Instrument Corp. F8 microprocessor with 1K byte of random-access memory (RAM) and 4K bytes of read-only memory (ROM).

Input to the computer is made either by using the 71-symbol keyboard, joysticks or preprogrammed cartridges that contain up to 13K bytes of ROM or RAM.

The unit can be attached to a standard television set and utilizes LSI circuits to provide high resolution and tonal ranges, the firm claimed.

The Videobrain has built-in text and timekeeping programs; they permit the user to type and edit messages of seven lines with 16 char./line and keep track of the year, month, date, day of week, hours, minutes and seconds in background to other programs, the firm said.

Programs available on cartridge include cash management, real estate analysis, music teacher, math tutor, blackjack and pinball.

With an ac adapter and television hook-up cord, the system costs \$500. Umtech is at 150 S. Wolfe Road, Sunnyvale, Calif. 94086.

## RCC REX System Features Z-80 And Double-Sided Floppy Drive

DAVENPORT, Iowa — Realistic Controls Corp. (RCC) has introduced a microcomputer system featuring a Z-80 microprocessing unit (MPU) and a double-sided microfloppy disk drive.

The Rex system includes an S-100 motherboard containing the MPU, 24K of random access memory (RAM), a CRT interface, bootstrap and monitor programmable read-only memory as well as power-fail and vectored interrupt circuitry, a spokesman said.

The system also has a 15A power supply and includes space for a second microfloppy drive plus five slots for S-100 bus options, he stated.

The microfloppy drive reportedly has a capacity of up to 75K bytes per diskette surface. Software options include Ansi Fortran IV with subroutine library and 8080 and Z-80 extensions; floppy disk operating system; file management system; text editor; and linking loader.

Equipment options are black-and-white or color CRTs, a radio frequency modulator generator, expansion microfloppy drives, RAM memory up to 64K, a 120 char./min

80- and 96-column printer, a programmable serial communications channel and a data communications modem.

Assembled and tested, the system costs \$2,495 from RCC at 404 W. 35th St., Davenport, Iowa 52806.

## D/A Board Fits Intel SBC-80

NORWOOD, Mass. — A digital-to-analog (D/A) converter board that is compatible with the Intel Corp. SBC-80 series of single-board computers has been announced by Analog Devices, Inc.

The RTI-1201 was designed to plug into the bus connector of the user's card cage. All analog interfaces are made through a pin-connector mounted at the opposite board edge, according to a spokesman.

Data conversion is performed through 12-bit D/A converters that are software-driven using double buffered registers, he added.

The unit also contains four high-current logic drivers for system control functions, the spokesman noted. These are software-

controlled open-collector drivers with 30V, 300mA capability.

Additional features include D/A read-back and reset functions; a 10V reference; memory overlay for random-access memory and read-only memory (ROM) inhibit; a multiple card select function; an on-board programmable ROM socket; four 20mA current loop outputs; and an optional single 5V power supply, the vendor said.

Applications for the RTI-1201 range from process control and laboratory automation to graphics plotting, automatic test equipment and electromechanical positioning.

Prices for the board begin at \$298 from Analog Devices, Rt. 1 Industrial Park, P.O. Box 280, Norwood, Mass., 02062.



## Unit Has Shugart Floppies

OAKLAND, Calif. — Digital Systems Corp. has announced a microcomputer system that includes two Shugart floppy disk drives and either 32K or 64K of random-access memory (RAM).

The Micro-2 features a Z-80 microprocessor unit (MPU), four RS-232C serial interfaces and a real-time clock. The disk controller can use either IBM 3740 or a double-density format of 571K bytes per disk (77 tracks of 58 sectors with 128 bytes per sector), the vendor claimed.

With optional double-sided drives, the system can store up to 2.3M bytes, a spokesman added.

The unit includes the Critical Path Method (CP/M) disk operating sys-

tem and hardware diagnostics. However, other software including C-Basic, Basic-E and Fortran is also available, the firm said.

The controller handles data transfers for sector read/write through a direct memory access (DMA) interface, permitting concurrent processor execution.

The Micro-2 with two single-sided drives costs \$4,995 with 32K RAM and \$6,090 for 64K RAM; with two double-sided drives, it costs \$5,695 and \$6,795, respectively; and with four single-sided drives, it is priced at \$7,040 and \$8,135.

Service contracts and OEM discounts are also available from the firm at 6017 Margarido Drive, Oakland, Calif. 94618.

## Micropolis Systems Include S-100-Compatible Floppies

CANOGA PARK, Calif. — Two floppy disk drives that are S-100-compatible and were designed to integrate into 8080A and Z-80 microcomputer systems have been introduced by the Micropolis Corp.

The Macrofloppy 1041 and 1042 both have a 143K-byte storage capacity and offer a transfer rate of 250 kbit/sec with an average latency time of 100 msec, the firm said.

Track-to-track access time is 30 msec and recording density is 5,162 bit/in., the firm stated.

Both units are hard-sectored into 16 sectors, each 256 bytes long, and contain 35 track/surface.

The floppy drives use a head-

positioner system that incorporates a stainless-steel lead screw with a steel follower. They feature a read-only memory (ROM) bootstrap loader and a file protect function, a spokesman said.

The units' disk operating system needs at least 16K of main memory to function, with 24K required for the firm's extended Basic, he added.

The 1401 with cabling, connectors, disk operating system and extended Basic is priced at \$695. The 1402 is priced at \$795 and includes a power supply and dc regulators.

Micropolis Corp. is located at 7959 Deering Ave., Canoga Park, Calif. 91304.

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## User Search Has Different Result

(Continued from Page 57)

of system and application software. Two important points that he failed to mention are:

- It appears Digital Group is offering Z-80 software which actually takes advantage of the larger Z-80 instruction set.

- The price is right.

The availability of good microcomputer software is a problem, especially Z-80 software. Most Z-80 owners are using 8080 software, negating the prime advantage of the Z-80 — its instruction set, which is about twice as large as the 8080's.

It seems most of the larger microcomputer manufacturers are not really interested in selling software. The trend seems to be for them to contract with a software company to develop an assembler and a Basic interpreter and leave the software development and sales to the computer stores, software companies and microcomputer magazine publishers.

Some of the larger companies, such as Mits and Imsai, are charging far too much for software such as the Basic interpreter, but that is my opinion.

My purpose in writing this article is not to deride Colsher or downgrade the Digital Group equipment. However, there are many sides to the selection of a microcomputer system, and there were certain points in his article I felt needed to be corrected.

It is not as simple as deciding whether you want an 8080, Z-80 or 6800 type of microprocessor, as implied in Colsher's article. One must also consider the impact a particular bus structure, the number of slots on the motherboard and the size of the power supply will have on future system expansion.

The user must decide if he will be doing significant system software development work and whether he wants a functional front panel with switches or a pad for entering data as well as lights or a digital readout for output.

Finally, the initial added expense of \$100 to \$200 on a basic system should not deter any serious microcomputer system builder, because it is the cost of the peripherals that really drives up the cost of a total system.

Heise is a hobbyist in Montgomery, Ala., who teaches a university course on minis and micros.



**F** **FAIL-SOFT SYSTEM** — A computer system which will continue to run (with deteriorated performance) despite failure in parts of the system.

**FAILURE, MEAN-TIME-TO (MTTF)** — The average time the system or a component or the system works without faulting.

**FAULT** — Refers to various physical conditions that cause a device, a component of an element to fail to perform in a required manner; for example, a short circuit, a broken wire, an intermittent connection.

**FEEDBACK** — When applied to transmission, feedback is the return of a fraction of the output to the input in a closed-loop system. It is part of the system which brings back information about the condition under control.

**FETCH** — 1. The particular portion of a computer cycle during which the location of the next instruction is determined. The instruction is taken from memory and modified if necessary. It is then entered into the register. 2. To bring a program phase into main storage from the memory image library for immediate execution. 3. The routine that retrieves requested phases and loads them

into main storage. 4. The name of a macro instruction (fetch) used to transfer control to the system loader.

**FIRMWARE** — 1. A term usually related to microprogramming and those specific software instructions that have been more or less permanently burned into a read-only memory (ROM) control block. 2. An extension to a computer's basic command (instruction) repertoire to create microprograms for a user-oriented instruction set.

**FLAG** — Refers to a bit (or bits) used to store one bit of information. A flag has two stable states and is the software analogy of a flip-flop.

**FLIP-FLOP** — A type of circuit having two stable states and usually two input terminals (or signals) corresponding to each of the two states. The circuit remains in either state until the corresponding signal is applied. Also, a similar bistable device with an input which allows it to act as a single-stage binary counter.

**FRONT-END PROCESSING** — Refers to minor microprocessors that are used to interface communication terminals to a "host" data processing system (an information processor).

## LEARNER'S LEXICON

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Byte, Kilobaud, Interface plus three other major microcomputer journals. Cover price is \$11.25. Your price is \$9.95 postpaid from Personal/Professional Computing Association, 436A Racetrack Rd. West, Fort Walton Beach, Florida 32548.

**Radio Shack TRS-80 Users.** Several financial, accounting and personal finance programs available on cassette. Write the Accountants' Computer Company, Suite 1748, 3390 Peachtree Rd. N.E., Atlanta, GA. 30326.

**Microdata 1600 Cpu (Reality) Wanted** for above: mag tape controller and disc controller (201) 751-3000.

Microsoft ("Altair") BASIC for 8080/Z80/6502 and FORTRAN IV for 8080/Z80 now available to OEMs, end users. 8080/Z80 BASIC has random, sequential files; double precision; IF ... THEN ... ELSE and more. FORTRAN produces optimized relocatable code, meets ANSI66 except complex. CP/M and ISIS-II BASIC or FORTRAN, off the shelf or custom versions. Microsoft, 300 San Mateo NE, Suite 819, Albuquerque, NM 87108 (505) 262-1486.

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<b>SAN FRANCISCO</b>	March 28, 29, 30
Northwestern Computer Expo	San Francisco Civic Auditorium
<b>HOUSTON</b>	April 11, 12, 13
Southwestern Computer Expo	Astros Hall
<b>ATLANTA</b>	April 18, 19, 20
Southeastern Computer Expo	World Congress Center
<b>ST. LOUIS</b>	April 25, 26, 27
Gateway Computer Expo	Gateway Convention Center
<b>CHICAGO</b>	May 2, 3, 4
Midwestern Computer Expo	McCormick Place
<b>NEW YORK</b>	May 9, 10, 11
Mid-Atlantic Computer Expo	New York Coliseum
<b>DETROIT</b>	May 23, 24, 25
Great Lakes Computer Expo	Cobo Hall
<b>BOSTON</b>	May 30, 31, June 1
New England Computer Expo	Northeast Trade Center

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### Tuesday

For you on the executive level, dealing with data processing personnel, problems, payments, plans.

#### The Executive Briefing.

A keynote speech, "Strategic Systems Planning: a View from the Top." Case Studies on Data Base and the Executive; Potentials of Distributed Data Processing. Presentations on Trends and Opportunities in System Financing; The Computer Resource of the Future.

### Wednesday — Simultaneous Double-Conference

For you who are bringing in a first computer system for a small company, or are involved in light inhouse computer use — maybe about to trade up — or just thinking about your own system.

#### Small Business Systems.

A keynote speech, "Data Processing in Small Business Today." Case studies on Computer Uses in Financial Reports; Computer Uses in Operations Planning and Reporting. Presentation on How to Negotiate with Vendors. Day-end panel that includes you, your questions, views and comments.

For you who interface with computer personnel on a day-to-day basis and need to anticipate, communicate, elicit their best work.

#### Managing People Problems.

A keynote speech by an expert in managing data processing personnel. Case Studies on Career Pathing for Operators and Programmers; Improving the User/DP Relationship. Presentations on Testing for DP Competence; Coping with Security/Privacy Regulations.

### Thursday

For you, the manager or technician whose organization is thinking of distributing its computer resources to regional offices and plants.

#### Distributed Data Processing.

A keynote speech, "Critical Issues in DDP." Case Studies on Applications for DDP; Equipment Selection. Presentations on Networking Aspects of DDP; The Data Base Question.

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Model	Old 168-3'	New 168-3'	3033	Old 158-3'	New 158-3'	3032	Old 148	New 148	3031
Purchase Price	5,826,050	4,388,460	3,605,000	2,279,765	1,597,865	1,900,000	859,000	799,000	1,000,000
Memory in Bytes (No. of Channels)	6M (12)			2M (6)			2M (5)		2M (6)
Price/Mo On 48-Mo Lease	132,999	122,629	77,480	48,155	45,290	43,740	22,650	20,740	25,000
Maintenance/Mo	9,791	9,466	8,320	2,619	2,604	6,500	2,405		3,070
Memory Size In Bytes (Minimum-Maximum)	1M-8M		4M-8M	512K-6M		2M-6M	1M-2M		2M-6M
Machine Cycle Time (Nsec)	80		58	115		80	180-270		115
Memory Cycle Time (Nsec)	320		290-464	620-1,035		320	405-540		345-805
Channels (Minimum-Maximum)	0-12		12-16	3-6		6-12	5		6
Price/Channel			\$320,000 (4 Channels)	See Footnote 2		\$360,000 (6 Channels)			
Multiprocessor Configurations?	Yes		No	Yes		No	No		No
Memory Buffer	32K		64K	16K		32K	0		32

CW Chart

The pricing trends of IBM CPUs have established a whole new set of ground rules in price/performance. Prices shown above include CPU, memory, channels, power supply and operator's console. Old prices are as of March 1, 1977.

1. Includes extended memory features.  
2. Price for fourth channel is \$16,160; for fifth, \$15,040; and for sixth, \$7,565.

## Price/Performance Game Rules Change

By Molly Upton  
CW Staff

During the last nine months of 1977, IBM changed all of the price/performance rules of the medium- to large-scale computer marketplace, recent figures compiled by *Computerworld* show.

The IBM moves (see chart above) are worth investigating; not only did they make IBM a low-cost alternative, but they also broke with more than 20 years of tradition in the industry.

The price slashing on IBM's part, in fact, was nothing short of revolutionary.

IBM machines went from being the industry's high price alternatives in March to the point where they ended the year on the lower end of the mainframe pricing totem pole, a significant turnaround [CW, Jan. 16]. More importantly, however, IBM accomplished the price cutting by setting a

whole new set of ground rules for pricing in the industry.

For 20 years each performance gain in the mainframe industry was accomplished by IBM at the cost of increased prices. The prices generally grew at about 45% for each 100% gain in performance. With the introduction of the 30 series by IBM, however, all that changed.

### An IBM First

Initially, the firm introduced a processor — the 3033 — with increased performance at reduced prices, a first for IBM. Then it introduced the 3031 and 3032; while these did carry higher price tags, the rate of increase did not follow the old curve when compared with the performance increases.

So now those competing with IBM have a whole new set of rules with which to live. The new, more erratic pricing structure

promises to cause problems in the future, observers believe.

Not only has IBM jettisoned its umbrella pricing stance, it has all but bared its fangs as a price-competitive vendor.

Late last March, IBM lowered its prices to be nearer — and even under — some of its competitors' prices. That move served to set the stage for the pricing of its 30 line.

If IBM's prices had remained the same on its 370s and if IBM had kept the same price/performance ratio on its 30 series, the prices of the new line would have been significantly higher. Using relative performance figures estimated by International Data Corp., a market research firm in Waltham, Mass., CW calculated that the 3031 would have cost \$2.5 million, the 3032 would have cost \$5.97 million and the 3033 would have carried a \$9.8 million price tag.

(Continued on Page 64)

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## Annual Growth Averaging 20%

# Input Sees '82 Service Revenues at \$14 Billion

By Jeffrey Beeler  
CW Staff

MENLO PARK, Calif.—Computer services has emerged in recent years as one of the fastest growing and most profitable sectors of the high-technology field, according to a newly published study entitled "Investment Opportunities in the Computer Services Industry."

Annual growth among computer services companies has averaged 15% to 20%, two to three times higher than the gross national product's rate of expansion, and the trend shows no sign of slackening, Input, a market research and consulting firm here, concluded in the study.

Industry revenues, which totaled \$5.9 billion in 1976, will rise to \$14.3 billion in 1982, when they will account for 20% of the U.S. computer business' total sales, the \$295 study predicted.

The industry's rapid expansion has resulted from growth in member companies of all sizes. Firms whose annual revenues exceed \$100 million grew from \$335 million in 1974 to \$541 in 1976 for an average increase of 39%, the study reported.

During the same period, \$20 million to \$100 million companies expanded 35% from \$160 million/year to \$216 million/year, while organizations under \$20 million swelled from \$68 million to \$100 million, an increase of 47%.

### Rise in Profits

At the same time, the corporations also reported a healthy rise in profits, the report showed. Among the largest firms, earnings jumped 40% from \$54.4 million to \$76 million.

For medium-sized corporations, profits rose from \$16.3 million to \$26.4 million, a 62% increase, while small companies averaged a 31% earnings growth from \$7 million to \$9.2 million.

This widespread prosperity has attracted many new entries to the computer services industry, Input noted. Large companies in the aerospace, petroleum, communications, insurance and banking industries view the industry as an opportunity to capitalize on a market with higher growth rates than in their own businesses, the study pointed out.

The entry of these newcomers in the market has swelled the ranks of the computer services industry to roughly 5,000 firms, including 2,000 processing suppliers and 3,000 software vendors, Input found. Among this number are several multimillion dollar firms, including

Automatic Data Processing (ADP), Computer Sciences Corp. (CSC), Electronic Data Systems (EDS) and Control Data Corp., the U.S.'s largest computer services company with annual service revenues of over \$500 million.

As with most other members of their industry, the leading computer services firms reported healthy growth, both

in revenues and earnings, during the past year. ADP's sales jumped 23% to \$145 million and its profits 25% to \$23 million, the study said.

CSC's 1977 revenues of \$235 million represented a 7% growth over the previous year's figure, while its earnings rose to \$11.6 million, a 61% increase.

A 23% sales jump boosted

EDS' revenues to \$164 million, compared with \$16.4 million in profits, which rose 21%.

In other findings, the study noted that many companies in the industry have begun to integrate new hardware developments into their services by supplying their customers with minicomputers, terminals, turnkey systems, dis-

tributed processing networks and advanced software. They have adopted this tactic to offset revenue drains caused by in-house mini- and microcomputers, the report speculated.

Input also predicted that IBM will reenter the computer services market in 1979 and that the move will effectively certify services as an acceptable alternative to in-house DP.

## How can you tell if distributed Look at the job it's done for us.

**Hewlett-Packard's  
Distributed Systems Network**

Most North American manufacturing plants and regional offices have HP 3000s to handle their local data processing needs, reducing the burden on the company's central computers. Major offices are linked with HP headquarters in Palo Alto by computerized communications systems. These are powerful enough to give the smaller sales offices plenty of EDP capability for such things as order processing and maintaining customer files.

In Brazil, our Campinas manufacturing plant is linked by computer to the main office in Sao Paulo. This in turn communicates with headquarters in California. Sales offices in Venezuela and Mexico have communications systems with sufficient computer power to handle local accounting and inventory management.

Most data from Europe is funneled through our European headquarters in Geneva. Data from sales offices is generally "queued" in the Geneva computers, waiting for the twice daily call from the U.S. All three manufacturing facilities in France, Germany and Scotland also use HP computers for accounting, order processing, management information and the like.

With two major factories in Malaysia (more than 3000 people), we cut down on communications costs by linking the Penang plant with our Singapore facility. Here data is consolidated for transmission to the U.S. Accounting, payroll and inventory is handled locally by HP computers. A similar situation exists in Japan, with the plant in Hachiogi connected with our main sales office in Tokyo. In Australia and New Zealand, HP sales offices are equipped for both local data processing and long distance communications.

# Kennedy to Keynote February CCIA Caucus

WASHINGTON, D.C. — The Computer & Communications Industry Association (CCIA) has added four new members and announced plans for its fifth annual Washington Caucus.

Sen. Edward M. Kennedy (D-Mass.) will keynote the caucus, which is set for Feb. 28-March 1 at the Madison Hotel here. In addition, Assistant Attorney General for Antitrust John Shenefield will

address the conference as will Allen Dougherty, director of the Federal Trade Commission's Bureau of Competition.

Major issues to be covered by the meeting include capital formation and tax policy, antitrust enforcement and reform, international trade, national telecommunications policy and federal procurement policy, according to Jack Biddle, CCIA president.

Frank Carr, the new com-

missioner of the Automated Data and Telecommunications Service of the General Services Administration, will make his first major address to an industry group at the conference, Biddle noted.

The new members of the association — which boost the membership to more than half of the "leading independent" vendors in the industry, according to Biddle — include General Datacomm In-

dustries, Inc. of Wilton, Conn., National Data Corp. of Atlanta, National Computer Systems, Inc. of Minneapolis

and Datum, Inc. of Anaheim, Calif.

The CCIA is at 1500 Wilson Blvd., Arlington, Va. 22209.

## New Companies

Misco, Inc. has been established to provide supplies and accessories for users of small computers throughout

the U.S. The firm is located at 963 Holmdel Road, Holmdel, N.J. 07733.

Rational Systems, Inc. will focus on software system development, design and implementation, primarily for mini and microcomputer-based real-time applications. The firm is located at 431 S. Cooper River Drive, Collingswood, N.J. 08108.

Western Microtechnology Sales, an electronics distributor firm, has been formed to specialize in advanced technology products such as microprocessors, LSI memories and advanced linear circuits for processing and instrumentation. Operations have begun in a new facility at 977 Benicia Ave., Sunnyvale, Calif. 94086.

XXCAL, Inc., a software house, has been formed to provide products and services to the DP industry. Its offices are located at 2423 S. Beverly Drive, Los Angeles, Calif. 90034.

Pathfinder Business Brokers, Inc. has been formed to assist principals in the purchase and sale of manufacturing and technology businesses. The company, whose offices are located in Suite 800, Southgate Office Plaza, 5001 W. 80th St., Minneapolis, Minn. 55437, also offers consulting services to both buyers and sellers.

Gen/Comp, Inc. has been formed to supply new and used minicomputers, controllers and peripheral devices to the computer industry and end users. It is located at 6 Algonquin Road, Canton, Mass. 02021.

Used Graphics Co. has been founded to provide the service of purchasing and reselling used and discontinued working graphics equipment. The firm can be contacted at Box 16013, Philadelphia, Pa. 19114.

## processing will work for you?

At Hewlett-Packard, we began distributing the computer workload around our factories in 1967. Then, in 1971, we instituted a worldwide systems network that has helped us grow to \$1.36 billion in shipments, with 42 percent of our business in computational products.

Today we make 4000 different products at 40 divisions around the world and have offices in 65 countries. This rapid financial and geographical expansion in a highly technical field made the distribution of our data processing an absolute necessity.

### We began with the basics.

Small systems went to work in our factories, automating the testing of circuit boards and, later, hand-held calculators. The next step was linking these minicomputers with other factory systems so they could relay data and programs. The obvious need then was to tie these computers into an information network so that key managers could make decisions based on accurate, up-to-the-minute data.

As we continued to grow, we connected our widespread sales offices with the factories. Today we have 130 high-speed communications systems in 94 locations, sending compressed data via satellite and phone lines. About 12 million words a day come into our California headquarters. Yet the cost is phenomenally low. For example, we can send a ten thousand word message to Toronto in one minute for 85 cents. On a teleprinter, it would take 16 hours and cost \$800.

### We need a system that can change. So do you.

One major reason our distributed processing approach works so well for us is the same reason it will work for you. It's extremely flexible.

You don't have to choose between a star network, or a circle, or a string. Our way, you can have any or all of them. And you can hook up an HP network for as little as \$5,000. You won't have to throw out your old equipment, either. Some non-HP computers and peripherals are still carrying a share of our workload. There's no reason why your present systems can't do the same for you.

The keystone of our system is the HP 3000, a powerful general business system. It communicates with the HP 1000, a computer generally dedicated to design, test and control applications in the factory. (Both can also link directly with an IBM mainframe.)

Most long-distance communications between sales office and corporate headquarters are handled by the HP 2026, which can also take care of on-site editing. This keeps information (much of it off-loaded from the central computer) on-hand for local use, shrinking the amount of unusable data funneled to headquarters.

We've just introduced new software for the HP 3000 that makes it an even more powerful management information tool. You can, for instance, sit down at your computer in New York and use all the processing power and data base of your Los Angeles computer—or any other HP 3000 in your network. Software is also available to tie HP 1000 systems together in a plant-wide information sharing network. So you can find out exactly what's going on in your business—from the ground up.

### Protecting the biggest investment of all.

Programming—that's where you really spend money. We know that from experience, too. We spent hundreds of man-years developing the operating software for the HP 3000. So we're just as interested in protecting that enormous investment as you are. We do it by designing our new systems to use existing software. They'll run your programs faster and more efficiently. Otherwise, you'll hardly notice the difference.

There's not much point in building good computers unless the peripherals are just as good. That's why we make our own printers, video terminals, disc and tape drives, and data entry devices.

If any part of the system does need servicing, we can fix it. With so many Hewlett-Packard offices around, we can respond quickly when you call.

### The moral of our story.

It's simply this. If you need to distribute your computer workload across oceans or in your plant, you don't have to go out on a limb. The Hewlett-Packard system has a bright future as well as a pretty impressive past. You can find out all about it by calling your local Hewlett-Packard office listed in the White Pages. Or write to Doug Chance, Hewlett-Packard, Dept. 316, 11000 Wolfe Road, Cupertino CA 95014. We'll send you information on Hewlett-Packard Distributed Processing. It could make a big difference in your company's planning.

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# Commerce Has Survey to Aid Marketing Abroad

WASHINGTON, D.C. — The U.S. Department of Commerce recently issued the first installment of a global marketing survey designed to help U.S. computer vendors boost their shipments of CPUs and peripherals to foreign countries.

Prepared by the department's Bureau of International Commerce (BIC), the publication is one of a series of market studies that describes overseas sales prospects for companies in 15 selected domestic industries, including the computer field.

BIC will periodically update

each of its 15 surveys with supplementary reports that it hopes will keep executives abreast of recent developments in foreign markets with high sales potentials.

The survey focusing on the computer industry consists primarily of a series of market analyses, one for each of 16 target countries including most of the Western European

nations and Australia, Brazil, Hong Kong, Iran, Japan, Mexico, Singapore and Taiwan.

Each of the separate analyses identifies the subject country's major computer markets and discusses the important sales trends within each sector. It also denotes the DP expenditures for each market area (manufacturing, banking, in-

surance, etc.) and estimates its installed base, which it examines by hardware category — peripherals, small business systems, minicomputers, medium-scale systems and large mainframes.

The 16 reports also deal in detail with the market trends for each major CPU size class and for each peripheral type — memory storage devices, data entry devices and output devices.

The reports also evaluate market trends in teleprocessing, analyze the employment outlook for DP specialists and examine each country's computer equipment imports by nation of origin.

Information on obtaining the surveys is available from the U.S. Department of Commerce, Bureau of International Commerce, Office of International Marketing, Room 1009, Washington, D.C. 20230.

## Technology Transfer Seen Easing U.S. Trade Deficit

WASHINGTON, D.C. — The increasing deficit in the U.S. balance of trade highlights the importance of the resolution of the technology transfer issue, according to William S. Anderson, chairman of NCR Corp.

An increase in the volume of foreign trade for the U.S. and a rise in technology transfer are closely related, he continued.

In view of a trade deficit of almost \$30 billion for 1977, the U.S. needs to expand its foreign trade and stimulate the growth of technology, he observed.

### Growth Slowing

In 1976 the volume of international trade grew by more than 10% whereas the 1977 growth rate was about 5%, and a further slowing is anticipated for 1978, Anderson indicated.

Although exports are accounting for an increasing percentage of the U.S. gross national product of the U.S. gross national product, up from 5% a few years ago to 105, "this country's competitive position in the interna-

tional marketplace has seriously eroded," he said.

"In 1958, for example, the U.S. share of the world's manufactured exports was 28%," Anderson said.

"Today that share has shrunk to 20%," he continued.

### Output Rising

Whereas a study indicates the manufacturing output from Western nations has been virtually flat since 1973, the output from developing countries has been growing at 6% a year during the same period, he observed.

"Meanwhile, the percentage of U.S. gross national product devoted to research and development has steadily declined — to the point where, in many industries, the technology of other Western nations equals, or exceeds, our own technology," he said.

"Those are disturbing developments. They suggest that we face not only the problem of achieving more intelligent control of the transfer of our technology, but also the problem of stimulating the further growth of that technology."

## IBM Changes Game Rules For Price/Performance

(Continued from Page 61)

The actual prices of these systems represent a savings of 68% to 56% over these hypothetical prices, prices that would have resulted had IBM continued its existing price/performance ratio from its 370 prices in early March.

### Cuts to 38%

Looking only at the pricing aspect of IBM moves in the past year, one can see the giant from Armonk effected a price cut of up to 38%, as in the case of the old price of the 168-3 and that of the 3033.

There was a 17% price cut between the old prices of the 158-3 and the 3032, while the firm levied only a 16% increase between the 148 and the 3031.

On the 370s alone, the price reductions effected last spring ranged from 42% in the case of

the 158-3 to 7.5% with the 148-3. The 168-3 dropped 32% in price.

### Ratios Skyrocket

But price alone does not tell the story. Indeed, the price/performance ratios have skyrocketed.

With the relative performance figures, using the same specifications for the systems as indicated in the chart, the 3031 represents a 162% performance improvement over the repriced 148 with only a 25% increase in cost. The performance and cost figures were identical in the case of the 3032 and the repriced 158-3.

However, with the 3033, there is an estimated 69% increase in performance accompanied by a 22% decrease in price compared with the 168-3's recent price.

### CITY OF RYE, NEW YORK

Notice to Suppliers of Electronic Data Processing Equipment and/or Services.

The City of Rye is soliciting proposals for the installation of an electronic data processing system capable of accommodating the joint computing needs of twelve Westchester municipalities.

The equipment proposed must meet the expected needs of the users for a minimum of five (5) years after hardware installation. The equipment must be geared for remote, on-line processing, as well as a batch processing mode for report generation.

Copies of the consortium's Request for Proposal may be obtained by contacting Mr. Michael Perril at (914) 967-5400 or writing:

Mr. Michael Perril  
Project Coordinator  
City Hall  
Rye, N.Y. 10580

Letters of intent to respond to the RFP must be submitted no later than 5:00 P.M. on February 2nd, 1978 at City Hall, Rye, N.Y.

Guy F. Carlsen  
Project Director

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Do you own the rights to proprietary source code, or have copies of Public Domain source code to:

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If that code runs on an Intel 8080 and/or an LSI-11, and/or an Interdata 6/16, then I want you to call me collect or write me a letter.

A handsome finder's fee will be paid for Public Domain code. Licensing of Proprietary code will be considered under most commonly practiced terms. Courtesy to agents, representatives and/or principals.

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# Mainframers to Gross \$15 Billion in '78: Probst

BLUE BELL, Pa. — Univac expects gross shipments by mainframe manufacturers worldwide will grow about 16% in 1978 over 1977, increasing to more than \$15 billion compared with \$13 billion last year, according to President Gerald G. Probst.

Univac itself is targeting a higher growth rate for its newly acquired minicomputer operations over the next five years than the average for the minicomputer industry, he stated.

Industry shipments of minis are growing at an average rate of 30% compared with an 18% average for the computer industry as a whole, he said.

Univac's minicomputer growth will result from greater penetration of both existing markets and new marketing areas, he added.

"We will continue to pursue the traditional minicomputer markets and, in addition, will place strong emphasis on using minicomputer products in distributed processing networks in conjunction with our larger systems," he continued. Univac acquired Varian Data Machines, now called Univac Mini-Computer Operations, last year.

The overall growth in the mainframe industry will follow existing patterns and come from expansion of existing computer installations, new applications, greater user development of computer-communications systems, increasing usage of data base management and expansion of both teleprocessing and distributed data processing networks, he said.

"Despite the predictions of some economists of an economic downturn in 1978, we are looking forward to another good year. Past experience has not shown any close parallel between the growth of the computer market and the strength of general business conditions.

"On the contrary, in recessionary periods business and industry strive more than ever to become more efficient in their operations and look to computers to play a leading role in reducing costs and extending the opportunities for potential growth," Probst stated.

The year now ending has been another successful one for Univac with computer revenues currently approaching 50% of the total revenue of Sperry Rand Corp., he said. Based on results for the first half of the current fiscal year, Univac is expected to establish new records in terms of revenue, bookings and shipments for the full year, he added.

Although the Western European nations did not recover as fast from the last recession as had been anticipated in 1977, the U.S. was a particularly strong market throughout the year for Univac. The Middle East continued to be a rapidly developing new market with a number of significant orders received from Iran. In South America, Brazil continued to be a strong market," Probst noted.

## Small Business Systems

In addition to entering the minicomputer market, last January the firm entered the small business systems market with the introduction of the BC/7 small business computer and its planned further extension into a complete family covering the needs of the small business marketplace, he continued.

"Within a short period of time, we created an entirely new nationwide sales and support organization dedicated to this market and product. The results to date have fully justified our commitment to this market and led to the release of the BC/7 to the Canadian market in September," he stated.

All of these new products maintain the price/performance advantages that Univac has traditionally enjoyed over the competition, Probst said.

## 1100/80 Popular

"The incoming rate of new orders for all of our products has been in line with or above our forecasts. In particular, our largest system, the 1100/80, has been exceptionally well received. Worldwide demand has boost-

ed the order rate for the 1100/80 more than 200% above the plan for the year. We are confident that the impetus generated by this system will continue strongly in 1978," he observed.

"We have continued our considerable investments in research and development during the year in such areas as bubble memory development, fiber optics and voice input and output.

"In addition, our extensive software development program has resulted in numerous enhancements to existing operating systems and programs as well as the creation of new application packages and work in such important areas as the privacy and security of information. This year, about 8.5% of our total revenues were invested in

R&D to give us one of the highest R&D-to-sales ratios in the industry," Probst said.

Univac will be consolidating all of its existing ISS disk memory system plants in the San Francisco Bay area into a new 400,000 sq ft facility in Santa Clara, Calif. In Winnipeg, Canada, it opened a new Defense Systems Division facility which will produce electronic devices to be used by the Canadian Defense Forces.

Overseas, a new complex of two multistoried buildings has been completed in London consolidating the various headquarters of its operations based in the UK including the International Division and the UK subsidiary company. A new Executive Centre has been opened near Nice, France.

## "We have not yet begun to distribute."

### A Special Report on Distributed Data Processing in our February 27th Issue

According to independent studies by Becker Research, Inc., only 20% of *Computerworld* subscribers' organizations "currently use a distributed approach to data processing," so the buzzword of the late 70's has yet to become a byword.

On the other hand, 27% of *Computerworld* subscribers say their organizations are now "planning to use a distributed approach to data processing" — which indicates a substantial current interest in what some have called the wave of the future.

Of course, there are still wide differences on just what is meant by distributed data processing. And that's one of the topics to be covered in our February 27th Special Report.

Edited by Esther Surden, this report will gather opinions on what DDP is from several sources, including mainframe manufacturers and users.

It will also give some practical help to DDP users and prospective users — with articles on configuring networks, distributing data bases, and selecting and maintaining equipment.

"*Distributed Data Processing*" will also report on users' experiences with DDP — both pro and con.

If you're into DDP, planning to be into it, or thinking about it at all; this report is the place to be when our February 27th issue reaches your desk. Closing date is February 10th.

And if you're marketing products or services in the DDP field, make sure your ad is there. Contact your *Computerworld* salesman, or call Terry Williams at (617) 965-5800.



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# POSITION ANNOUNCEMENTS

## SENIOR PROGRAMMER/ ANALYST

Mattel Toys has a challenging position for a senior analyst offering exposure to a sophisticated online data base/data communications system on our IBM 370-158-3 and participation in the development of a distributed manufacturing system utilizing IBM 3790's. Applicants should be self-starters eager to participate in a challenging state-of-the-art environment. 3 years COBOL programming experience in an IBM OS or VS environment is required. Previous experience with online data base/data communications and TSO is desired. Salary commensurate with experience. Send resume with salary history to:

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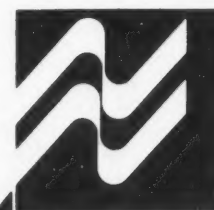
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Three or more years' mini or micro-computer systems experience is required. Responsibilities will entail development of software and firmware diagnostics for current and next generation systems. Requires a BS or equivalent.

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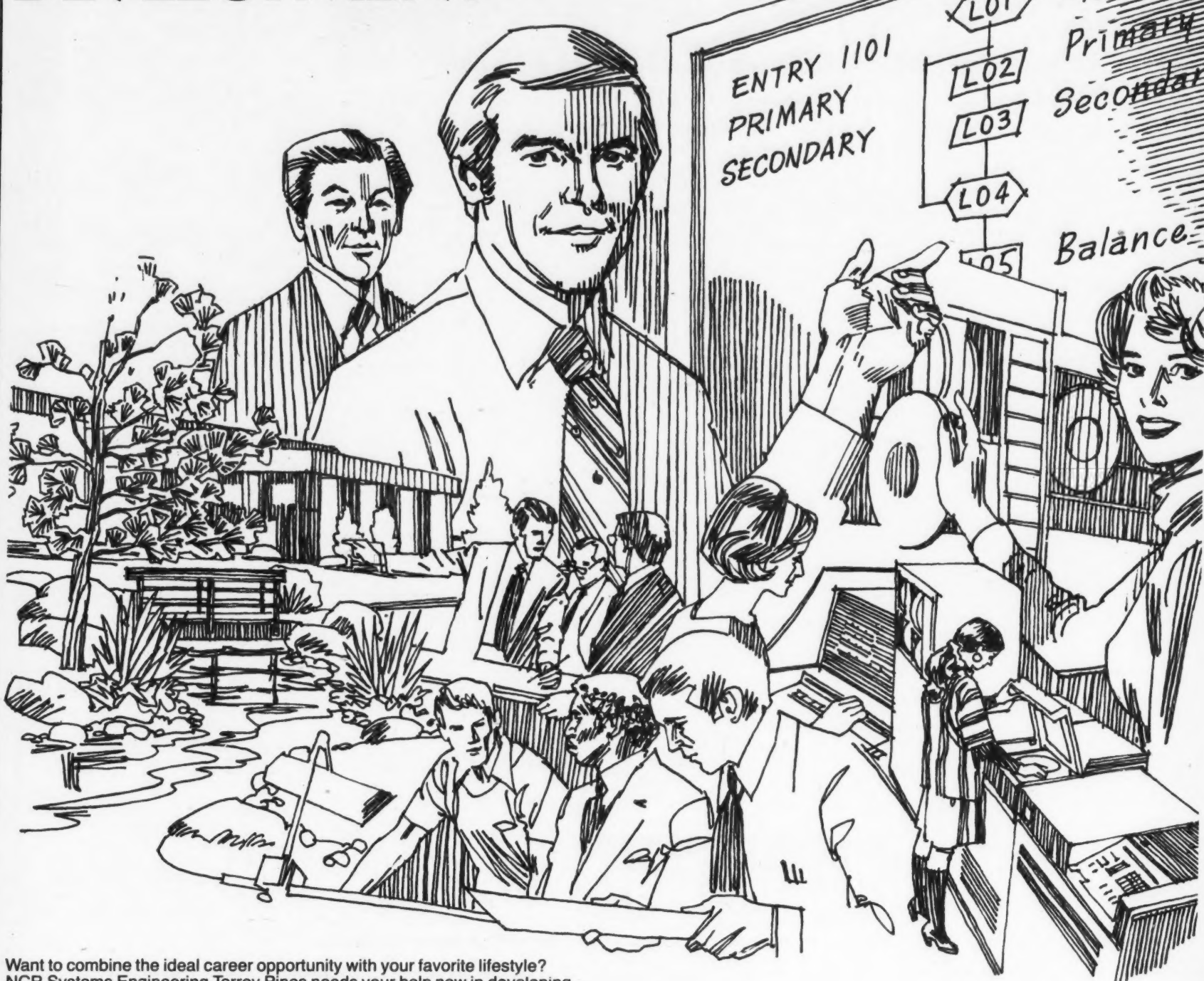
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# San Diego Openings for COMPUTER PROGRAMMERS IN SOFTWARE SYSTEMS DEVELOPMENT



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Responsibilities include interacting with other senior level engineers in the areas of programming research and design problems, plus acting as a consultant on advanced computer system technology.

You should have a BS in Mathematics, Computer Science, or other technical discipline, or equivalent, plus 3-7 years programming experience. A background with large-scale operating systems is a plus.

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We need a highly qualified individual to help us design, measure, and evaluate high performance software systems with an expertise in demand paging operating systems, commercial languages and data management. You'll also handle the technical aspects of these systems including hands-on activities and coding. And it's most important that you're able to translate resultant findings into understandable market terminology for our sales force to utilize. Hardware experience is not necessary. This is a difficult but highly visible career assignment with extraordinary career potential.

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## Government of Kuwait Ministry of Planning Computer Center

The Computer Center provides services to Ministries and other government organisations in Kuwait. The present installation is an IBM 370/158 with RJE and conversational terminals. The computer is run under VM/370, with OS/VS1, DOS/VS and IMS/VS.

The Computer Training Center forms part of the Computer Center and provides EDP training to the Computer Center and

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The Computer Center is recruiting the following staff to help support future services to the Kuwait government.

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Salary up to \$50,000 p.a.

The main duties of the manager are:

- \* line management of the Training Center
- \* planning government staff training needs with Ministries and the Computer Center
- \* evaluating and planning the acquisition and implementation of new courses.

Applicants for this position must have:

- \* managed a number of systems development projects from initiation to installation
- \* experience in training computer and user staff
- \* at least 2 years' experience of managing a computer education activity with complete responsibility for budgetary control, staff, student administration and course development and presentation.

### Production Supervisor - Training Center.

Salary up to \$38,000 p.a.

The main duties of the supervisor are:

- \* preparation of course schedules and lecturer and physical resource allocations
- \* liaison with external training organisations providing courses to the Center
- \* maintaining quality standards on all courses
- \* presenting some courses.

Applicants for this position must have:

- \* managed a number of system development projects from initiation to installation
- \* experience in training computer and user staff
- \* excellent communication skills
- \* been responsible for the development of computer training courses.

### 3 Lecturers - Training Center.

Salary up to \$30,000 p.a.

The main duties of the lecturers are:

- \* course presentation
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Applicants for these positions must have:

- \* practical experience over 3 or more years as a system designer, lead programmer or shift supervisor
- \* experience in training computer and user staff
- \* excellent communication skills.

At this time all salaries are tax free. Higher salaries can be negotiated for exceptionally well qualified candidates. In addition employees receive free, furnished accommodation and 45 days holiday per year with free air tickets for them and their families to the port of embarkation.

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The successful candidate will have prior supervisory experience in accounts payable, accounts receivable, payroll and cash flow forecasting. Will also be responsible for controls and processing methods for travel expenses. We prefer an individual with an accounting degree coupled with either an MBA or a CPA. The successful candidate will have prior experience in general accounting supervision. This is a replacement position as a result of promotional opportunities. The successful applicant will be headquartered in our Divisional offices in Fort Lauderdale, Florida.

### SENIOR COST ACCOUNTANT

We prefer a bachelor's degree plus an MBA in accounting. The individual we seek will be responsible for closing, cost accounting accounts, preparation of financial statements for new products and P&L by product line. In addition, the individual will interface with Management Information Systems group for the design and implementation of new or improved systems and procedures. This position has excellent growth potential into financial management.

### FIELD MARKETING ANALYSTS

The individuals we seek will have broad exposure for pre and post analyst field support. We prefer experienced systems personnel having backgrounds with Honeywell, UNIVAC, Control Data, IBM or RCA mainframe exposure. Experience in FORTRAN and COBOL with a solid grasp of operating systems will be helpful in aiding our customer revenue base. This position is the result of a solid product line and competitive expansion in the data processing community. Individuals seeking a company with a future in the data processing community should consider HARRIS. We prefer degreed individuals with 3+ years' experience in the field. Several positions are available throughout the United States, including Florida.

### SOFTWARE DEVELOPMENT ANALYST

We prefer a minimum of a BS in Computer Science or math coupled with a background in Systems Software or Systems Software Development. The successful candidate will be assigned to our VULCAN Operating System and will interface with our compiler development group in maintenance and/or development of new high level languages. The development of compiler check-out programs will be necessary to fill our requirements.

### SENIOR SALES SUPPORT SPECIALIST

An excellent growth position which leads to several marketing management positions. The individual we seek will be responsible for interfacing with key marketing personnel in assisting with software demonstrations at our Fort Lauderdale location, as well as in several key regional areas. Responsibilities will also include technical presentations to key accounts, trade show participation, in-depth involvement with program conversion, which interfaces with our benchmark analysis group in order to bring about successful benchmarks. We expect that the successful candidate will be instrumental in providing pre sales and post sales support where needed. We prefer a BS degree in Computer Science or math plus 5 years' of programming and systems experience. Expertise in FORTRAN and COBOL are necessary.

### SENIOR SOFTWARE ANALYST

Due to the rapid introduction and sale of our S-100, S-200 Computer System, which incorporates the VULCAN, multi-purpose virtual operating system, our Quality Assurance group has established this new growth position. The individual we seek must have a BS or MS degree in Computer Science or math and a minimum of 5 years' solid experience in operating systems coupled with some in-depth exposure to compilers. Language capabilities should include a minimum of Assembly, FORTRAN and COBOL. In addition, communications skills, both verbal and written, will be necessary. Functional responsibilities include: establishment of Quality Assurance tests with appropriate documentation and advance planning for continuous software testing. In accomplishing these tasks, vertical and lateral communication with key management personnel will be expected. Software oriented individuals with familiarity with CPU's and Operating Systems from CDC, H-P, DEC, UNIVAC and/or IBM will help in determining applicant's success.

### SENIOR SOFTWARE TECHNICAL WRITERS

Will be responsible for both reference and user manual production. Senior writers must have a minimum of 2 years' experience plus a degree in Computer Science or English.

### HARDWARE TECHNICAL WRITERS

The individuals we seek as applicants must have digital logic backgrounds as well as digital computer experience. 2-4 years' minimum experience in the technical writing field coupled with mil-spec documentation is desirable. 5-10 years' experience will satisfy applicant's requirements.

### OPERATING SYSTEMS ANALYST

For design and development in medium to large scale operating systems. Computer Science degree, math or a scientific discipline coupled with ASSEMBLY LANGUAGE experience. Will design and develop enhancements for a large virtual memory operating system or the communications software associated with the operating systems.

### SYSTEMS ANALYST - COMPILERS

A major new compiler development effort offers growth positions for candidates with appropriate compiler experience plus a BS degree in Computer Science or math.

### SENIOR FIELD SERVICE ENGINEERS

Several positions are now available throughout the United States and parts of Canada for experienced individuals having a minimum 2-5 years' in large to medium scale computer systems. Hardware and software knowledge, as well as installation, trouble-shooting, maintenance and repair on peripheral hardware necessary. The most successful candidate will come from CDC, UNIVAC, Honeywell, IBM, DEC or H-P.

### QUALITY ASSURANCE ENGINEERS

Responsibilities include diagnosing and resolving manufacturing quality problems, generating quality standards and inspection procedures and reviewing new design and engineering changes. Experience in Quality Cost reporting and Corrective Action systems is desirable. BSEE, ME or IE with 6 years' experience in the manufacture of computer or related electronic equipment, or an MS with 4 years' experience.

### DIAGNOSTIC ENGINEERS

Immediate openings in our Engineering area for digital hardware and diagnostic software engineers. We require a possession of in-depth knowledge of software design/implementation, digital fault isolation and protection procedures. Successful candidates will be degreed in engineering or possess suitable on-the-job experience.

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Individuals experienced in the design and development of digital computers will be most welcome in our engineering development area. We prefer degreed individuals having a minimum of 2-5 years' experience in the development of CPU circuit design.

### PRODUCT SPECIALIST

Must assist design engineers in the development of new computer paraphernalia and communications products, generation of engineering documentation, interface with prototype testing, product assurance testing and change order control. Associate degree preferred; 1 year of experience in production development area desired.

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Will develop and maintain Time Standard Data Base and perform cost estimating for new products. Special products and engineering change orders will also be functional responsibilities. WE seek an individual with the ability to design systems which will automate cost estimating functions, and must have the ability to audit manufacturing processes. BS degree in IE preferred.

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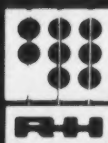
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Robert Half, staffed by EDP professionals for EDP professionals with 55 offices throughout the U. S., Canada & Great Britain, is the largest network of personnel consultants in the Data Processing field. And its establishment in 1948 also makes Robert Half the oldest. One call and you can search the local, national and international markets. All fees are paid by client companies, of course. The following is a partial listing of opportunities and locations:

### DALLAS

The demand for EDP professionals continues extremely high in the Dallas area. We have immediate openings at all levels, salary ranges. All fees, interview, and relocation expenses are completely paid for by our client companies.

A brief example of a few of our current openings:

Prog./Mgr.-Mfg. to 26K  
Prog./Analyst - Trans. Co. to 23K  
Programmer-Insurance Co. to 17K  
Sys. Engineers-Electronics Co. to 23K  
Sr. Prog./Analyst-Insurance Co. to 21K  
Teleprocessing-Manufacturer to 25K  
ALC Programmer-Insurance Co. to 25K  
Sr. Analysts-Petroleum Co. to 21K  
Software Development-Mgr. to 24K  
Sys. Programmer-Petroleum Co. to 26K  
Sr. Programmer/Analyst-Bank to 21K  
Project Manager-Communications to 28K  
Consultants-CPA Firm to 25K  
Lead Prog./Analyst-Bank to 22K

Please rush your letter or resume on a strictly confidential basis to:

Ron Urbach  
Suite 750  
Dallas, Texas 75231  
(214) 363-3300

### ATLANTA

Sr. SYSTEMS ANALYST to \$22,000

Large bank seeks seasoned individual with design exp. on IBM 370/158 OS/VS Prefer degree, banking & IMS.

PROGRAMMER/ANALYST \$15-\$18,000

Local hospital is recruiting for a Prog./Anal. Prefer bkgd. of ANS COBOL Syst. design, CICS and BAL exp. 370/145 shop. Growth potential.

3379 Peachtree Rd., N.E.  
Atlanta, GA 30326  
(404) 266-2153

### TAMPA

P/A 370/OS IMS to 18K  
Scientific Real Time to 18K  
P/A NCR Bkgd CIF to 15K  
ANAL Hospital Sys to 18K  
Scien Mini graphics to 20K  
P/A DOS/VS CICS mfg. to 16K  
Burr Mfg on line to 15K  
Sys Prog DOS or OS to 18K

Contact:  
Stan Allen  
1311 No. Westshore Blvd.  
Tampa, Florida 33607  
(813) 876-4191

### PITTSBURGH

PROGRAMMER/ANALYST  
Subsidiary of nat'l. corp. seeks person possessing 2 yrs. programming experience with working knowl. of OS/COBOL & JCL. Emphasis on mfg. applications. IMS Data Base and/or knowl. of RPG helpful. Salary to \$20,000.

SYSTEMS ANALYST  
Northwestern PA location. Excellent oppy. for small town, outdoor living. Company seeks person with Project Leader abilities & exposure to Ige. IBM-DOS, COBOL & Mfg. applications. Oppy. for rapid promotion. Salary to \$24,000.

OS/SYSTEMS PROGRAMMER  
Exciting oppy. available for Systems Programmer with Ige. Pittsburgh conglomerate. Abilities in OS programming, MVT and/or TSO are necessary. Salary to \$22,000.  
Contact:  
Elizabeth Hardtmayer  
Gateway Towers  
Pittsburgh, PA 15222  
(412) 471-5946

### HOUSTON

IMS PROGRAMMER ANALYSTS

Are in great demand in the Houston area.

(32) MS Oil & Gas \$16-19,500  
(39) MS Banking  
IMS Insur. \$16-20,000  
(12) IMS Mfg. \$16-20,000  
Many other positions such as Analyst, Prog. Leader and Non-IMS Programmer Analysts.

Contact Jim Fleming  
4801 Woodway  
Suite 231W  
Houston, Texas, 77056  
(713) 961-3271

### MINNEAPOLIS

PROGRAMMER/ANALYST  
Be one of the first to join this major company's new in-house EDP staff new positions - unlimited opportunity for growth. If you have several years COBOL OS, VS and big systems, company offers outstanding salaries & benefit package.

Contact Richard Haney  
2236 Ids Center  
Minneapolis, Minn. 55402  
(612) 339-9001

### MIAMI

SYSTEMS PROGRAMMER  
Lge. So. Fla. corp. seeking self-motivated professional with proven track record in generation/maintenance of DOS/VS, CICS/VS systems. Indiv. must be able to evaluate new DP packages. This is a growth position. Salary to \$18,000. All fees paid, many additional oppy.

1395 N.W. 167th Street  
Miami, Florida 33169  
(305) 625-5433

### SAN FRANCISCO

No. Calif.

SR.SYS/PROGRAMMERS  
Our clients need software prog's. for their IBM 370/IMS/MVS and 370/VM/CP/CMS installations.

CONSULTANTS  
COBOL To Implement systems in an IBM 370/IMS shop. Many positions.

RPG II  
PROGS. ANALYSTS  
Learn OCL in Systems 3 shop. Many positions to D.P. Mgr.

Jerry Anderson  
111 Pine Street  
San Francisco, CA 94111  
(415) 434-1900

### BOSTON

PROGRAMMER ANALYST  
Large local electronics mfr. has immediate need for sharp programmer w/tech. exp. in fin'l. applications. Min. 1 year exp. in BASIC +. DEC exp. a plus. \$16-\$17,000 (Fee Paid).

SYSTEMS ANALYST  
Major suburban computer mfr. seeks degreed indiv. w/strong systems analysis exp. in mfg. systems. COBOL programming a must. BASIC+, MUMPS, RSTS a plus. \$19-\$21,000 (Fee Paid).

Contact Jim Staunton  
140 Federal Street  
Boston, MA 02110

### PROVIDENCE

PROGRAMMER/ANALYST  
Leading R.I. electronics mfr. seeks an aggressive "pro" in the development of mfg. systems. Strong COBOL DOS/VS exposure. IBM 370 environment. MRP/CICS knowledge necessary. \$20,000 (Fee Paid). Contact:

Dee Ecker  
400 Turks Head Building  
Providence, R.I. 02903  
(401) 274-8700

### BUFFALO

SYSTEMS PROGRAMMER  
Fin'l. institution converting to IBM 370/115 needs programmer with Assembler & DOS/VS bkgd. Intimate shop requires systems expertise to head up & maintain present programs. \$16,000 (Fee Paid).

Contact P. Siegel  
1310 Liberty Bank Bldg.  
Buffalo, NY 14202  
(716) 842-0801

### FREE:

Ask for our latest "EDP Salary Survey".

### KANSAS CITY

KC state of the art installation needs a degreed programmer to train as an analyst. No programming required in this high visibility position. Salary \$18,000.

Local \$50 mil. mfr. needs take-charge mgr. to make major equipt. upgrade & to install new mfg. systems. Job reports to Pres. Base salary of \$25,000 with bonus.

Nationally based KC firm has announced major staff expansion for '78. Multiple openings exist for Programmers with min. 2 yrs. OS-COBOL exp. & Project Leaders with heavy inv. control. Salary range \$17-25,000

All fees and expenses paid by client companies. For confidential review of where you might fit, contact:

George Waterman  
127 West 10th Street  
Kansas City, MO 64106  
(816) 474-4583

### ST. LOUIS

Sys Anal.mfg. COBOL 22K  
JCL, TSO  
Sys Prog. mini computer bkgd 25K  
/A 370/OS COBOL 20K  
Scientific Prog. Fortran CDC, Equ. 18K  
Sys Prog (software) CDC CYBER 23K  
P/A B-4700 COBOL banking 18K  
P/A 370/OS PL/I 19K  
Sys Prog compiler design 23K  
P/A NCR-101 NEAT III 17K  
P/A COBOL-RPG II Sys 3 16K  
DP Manager retail 360/370 25K  
D.B.-A. 370/OS, IMS 22K  
Consult. mfg degree 22K

7733 Forsyth Blvd.  
St. Louis, MO 63106  
(314) 727-1535

### MICHIGAN

Southfield & Grand Rapids  
Data Process. Professionals are in high demand in the Michigan area. We have immediate openings at all levels and salary ranges. All fees and relocation expenses are paid by our client companies. Please call or send us your resume in strict confidence.

670 Honeywell Ctr.  
Southfield, MI 48075  
(313) 559-1212  
456 Frye Bldg.  
Grand Rapids, MI 49503  
(616) 458-2333

### KENTUCKY

Rapidly expanding Mfg. co. is developing a national TP Network using VTAM, NCP. Opportunity exists for 2 growth-minded PROG./ANALYSTS with exp. using COBOL for 370DOS/VS, POWER/VS shop. CICS and DB concepts desired. Salary to 19,000 D.O.E. Sr. - d resume in confidence to Larry Weathers.  
680 South 4th Street  
Louisville, Kentucky  
(502) 589-8657

### LOS ANGELES

SR. PROG. ANALYST

Our client, a major retail chain, is expanding their staff by the addition of 2 Sr. Programmer Analysts. These positions require a min. of 4 years exp. in the design, development & programming of on-line systems. OS BAL, CICS & PLI are required. A knowl. of COBOL is a plus. Starting salary to \$25,000 (Fee Paid).

Contact Duncan White  
3600 Wilshire Boulevard  
Los Angeles, CA 90010  
(213) 386-6805  
500 So. Main Street  
Orange, CA 92668  
(714) 835-4103

### SO. CONN./ WESTCHESTER

The third largest concentration of Fortune 500 headquarters in the USA is here! You will gain career advancement and the life style others will envy in this culturally endowed, beautiful section of Suburbia. Our clients need:

Systems Project Mgrs.  
Systems Analysts  
Software Programmers  
Application Programmers  
Technical Support Programmers Analysts  
Hardware "Biggies" and "Minis"  
Send resume and salary history to:  
Robert Half/EDP  
111 Prospect St.  
P.O. Box 1392  
Stamford, Ct. 06904  
(203) 325-4158

### DENVER

Excellent positions available for the EDP "pro" with the desire for The Rocky Mountain Region. Example of two currently available positions: applications support group 370/145 DOS/VS. COBOL EXP. KEY. Also, Data Processing Operations Mgr. with a large Colo. Bank Holding Grp. Must have strong DP admin. background.

Contact  
Steve Newman  
1515 Arapahoe Street  
Denver, Colorado 80202  
(303) 629-1010

### HARTFORD

DIR. CORP. SYSTEMS  
N.E. insurer creating top executive position resp. for long range systems planning of prop. & casualty business. DP exposure is desirable as future may lead to top DP resp. Salary to \$33,000 (Fee Paid).

Contact Stan Durbas  
111 Pearl Street  
Hartford, Conn. 06103  
(203) 278-7170

### MILWAUKEE

IMS ?  
Well run major installation is looking to challenge person with large scale COBOL programming experience. IMS & TSO are big plusses. \$22,000 (Fee Paid).  
777 E. Wisconsin Avenue  
Milwaukee, WI 53202  
(414) 271-9380

### C.C.P. Programmer Systems Analyst

We are an irregular route carrier seeking an individual with System-3 programming experience. Our major emphasis is on-line applications, so individual should have three to four years of RPG-II experience with at least one year of C.C.P. knowledge of the trucking industry helpful.

Salary commensurate with experience, education, and ability. Send resume and salary history in confidence to:

CW Box 1386  
797 Washington St.  
Newton, MA 02160  
Equal Opportunity Employer

### REMOTE JOB ENTRY COMPUTER TIME SALES

Leading Midwest computer services firm is seeking a marketing rep with experience in selling RJE. Knowledge of DP concepts and good communications ability is required as well as knowledge of IBM, VS-Hasp environment. Salary in 20's. Please send resume and salary history to:

Director of Marketing  
Phoenix-Hecht  
233 N. Michigan Avenue  
Chicago, Illinois 60601



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Move up to increased pay and promotional opportunities  
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PHILA. AREA  
TWIN CITIES  
NEW YORK

Marketing/Sales  
Operations Mgr  
Data Base Mgr  
Director of MIS  
Sys Planner  
Sr Sys Analyst  
Sr Sys Analyst  
Sys Progrs  
Sys Conslt  
Mini Progrs  
Account Rep  
Programmers  
Sys Designers  
Anal/Pgrs  
Programmers  
Programmers

### Urgent Openings

	To
Banking/GEM/Consulting	\$35M
CDC 6600, Res'ch envr., Deg.	\$30M
Oil Co., Deg.	\$28M
College/Univ exp., Deg.	\$35M
Mktg Syst., Oil Co.	\$28M
Mktg, Proposals, MBA, Pgr	\$30M
Dir. Mail, Mgmt pos.	\$27M
370/VSI, VM, Internals	\$28M
H 6600, GECOS, TSS, IDS	\$27M
Process Ctl, non-defense	\$25M
Fin Sys, University env.	\$24M
COBOL/OS	\$22M
Banking/Ins/Lge scale	\$25M
Top consulting firm	\$30M
Data Base, IMS or TOTAL	\$22M
1 yr exp, Deg., IMS trng	\$16M

No fees or contracts. Our client companies pay all expenses.  
Career consultation prior to any action. Over 700 EDP positions  
represented.

Send your current resume (or an old one with pencil update)  
together with salary history in complete confidence to our  
suburban Philadelphia headquarters:

Systems Personnel, Inc.  
Suite A 4  
207 Fox Lane  
Wallingford, PA 19086  
215-565-2920

# Systems Personnel

A NATIONWIDE CAREER SERVICE

### Computer Professionals



Deere & Co., a leading manufacturer of agricultural equipment, has openings for the following positions:

#### SYSTEMS ANALYST

You must have a minimum of 2 years experience, including IMS, in an IBM environment, preferably in manufacturing areas. Responsibilities will be varied.

#### PROGRAMMER

Prefer a minimum of 2 years experience with IBM equipment and a knowledge of COBOL, PLI, and FORTRAN. We offer qualified candidates excellent starting salaries and comprehensive company-paid benefits including paid relocation to Iowa. For consideration, please submit your resume, including salary history and current requirements to:

Ronald H. Like  
Manager, Professional Employment  
Deere & Company  
Moline, Illinois 61265  
An Equal Opportunity Employer M/F

## SYSTEMS PROGRAMMER

A rewarding and stimulating career opportunity offering the professional and personal recognition you seek is available now at the new Earth Resources Observation Systems (EROS) Data Center. This facility is the national center for the processing and dissemination of spacecraft acquired imagery and electronic data of the Earth's resources. These positions are available immediately for individuals with the following qualifications:

Degree in computer science or related discipline with experience in maintenance and trouble shooting of computer systems software including supervisors, compilers and utilities. Experience in systems support of B-6700 computer preferred. Major efforts include support of:

- \*B-6700 Multi processor systems
- \*Data communications network
- \*Large on-line data base
- \*Mini computer image processing systems
- \*Array processing hardware

Excellent income, comprehensive benefits, relocation assistance, and the advantages of our midwestern lifestyle await you. Join Technicolor Graphic Services, Inc., a wholly-owned subsidiary of Technicolor, Inc., Hollywood, California, for an exciting career opportunity at the EROS Data Center.

FOR PROMPT AND CONFIDENTIAL CONSIDERATION, OR ADDITIONAL INFORMATION, SEND RESUME TO:

Mr. J.C. Pfleger

**TECHNICOLOR GRAPHIC SERVICES, INC.**

P.O. Box 1242  
Sioux Falls, South Dakota 57101  
An Equal Opportunity Employer M/F

### NEW ENGLAND

E.D.P. DIVISION

#### NATIONAL PERSONNEL CONSULTANTS PROGRAMMER ANALYST

Western Connecticut unparalleled growth influx of Corp. Hdqrs. Offers exciting opportunities for experienced programmers and analysts, comm'l, scientific, and software areas.

AAA Personnel Assoc.  
14 Hayestown Ave.  
Danbury, CT 06810

(203) 744-1820

Since 1960

#### NEW 1978 EDP LISTINGS

New Year budgets are completed (OUR CLIENT COMPANIES ARE EXPANDING) We have many new openings in MFG, INS, Banking areas for exp'd Programmer Analysts and Systems Analysts. Salaries range from teens to mid 20's. Send resume or call for more information.

DYNAMIC PERSONNEL  
181 Park Avenue  
West Springfield, Mass. 01089  
413-734-5628

#### EDP PROFESSIONALS

Openings for PROGRAMMERS, ANALYSTS, and SOFTWARE PROFESSIONALS. Clients include INSURANCE, CORPORATE HEAD-QUARTERS, MFG, BANKING, CONSULTING.

#### ACCESS GROUP

Suite 303 37 Lewis Street  
Hartford, Connecticut 06103  
(203) 527-9107

Client companies represent all industries and assume all expenses.

#### NATIONAL PERSONNEL CONSULTANTS

Over 90 Offices Nationwide  
Register with any of us  
and cover the U.S.A.

## LUKENS STEEL - A MODERN COMPANY COMMITTED TO GROWTH- SEEKS LEAD COMPUTER ANALYST

Five or more years experience designing and implementing teleprocessing applications in a manufacturing environment. Will be required to direct activities of a three to five person Task Force. Objective is to design and integrate a network consisting of process control, voice data collection and expanding an existing 25 terminal network.

Experience preferred in: IBM 370/145-148 DOS/VS, TOTAL Data Base, ENVIRON-1, POWER, COBOL, LIBRARIAN. Degree required, 22-26K.

Reply in confidence to:  
Mr. George P. Kissell, Jr.  
Lukens Steel Company  
Coatesville, Pa. 19320  
(215) 383-2232

An Equal Opportunity Affirmative Action Employer M/F

## PRODUCT MARKETING MANAGER

ECRM Inc., a manufacturer of sophisticated computer equipment for the graphic arts industry, presently seeks a Product Marketing Manager for our innovative 7600 Copy Processing Systems.

The prime responsibilities for this position include the coordination of the entire sales/marketing effort as related to the 7600 System, as well as providing input to engineering and marketing on system features and enhancements. Also, support of the sales force through up to date documentation. The ideal candidate will have a thorough knowledge of the newspaper and/or commercial printing industry, and a strong background in sales and/or marketing for multi-terminal systems.

This is a highly professional position reporting directly to the corporate director of Sales and Marketing and offers the appropriate challenge and compensation. For more information or to arrange an interview call Cynthia Carney, Personnel at (617) 275-1760 or send resume in confidence to:

ECRM, INC.  
205 Burlington Rd., Bedford, Mass. 01730  
Equal Opportunity Employer M/F

# ECRM

## MINICOMPUTER CUSTOMER ENGINEERS

We Offer You The  
OPPORTUNITY TO EXCEL

The University of California's Los Alamos Scientific Laboratory needs outstanding applicants to support our expanding, multifaceted R & D efforts. If you desire challenge, responsibility, and the chance to excel, we invite you to apply for a career with us. Incumbents will work independently, diagnosing and repairing a wide variety of computer systems and components in the DEC PDP-11 family - including mainframe, memory, peripherals and desk storage systems - in response to trouble calls from users of computer systems.

The successful candidates must be technical school graduates (or equivalent) with significant manufacturer's training. In addition, several years' experience maintaining the PDP-11 family of computer systems, as well as an excellent working knowledge of trouble-shooting techniques, central processors, mass storage devices and other computer equipment, are required.

We provide excellent compensation, working conditions, and benefits (how does 24 days' annual vacation sound?). Our location in the mountains of northern New Mexico offers a pleasing lifestyle in a setting of great natural beauty: abundant recreational opportunities; a pollution-free environment; and casual, uncrowded living. Please send complete resume, in confidence, to, or request application from:

James Trout  
Division - 78-Z  
Los Alamos  
Scientific Laboratory  
P.O. Box 1663  
Los Alamos, New Mexico 87545



An Affirmative Action/Equal Opportunity Employer. Women, Minorities, Veterans, Handicapped, Urged to Apply. U.S. Citizenship Required.



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## SOFTWARE SALES DIRECTOR

Design and implement sales and marketing strategies for NYSE firm. Hire staff, co-ordinate market research, make this firm GROW. Base salary to \$30K plus commission. All inquiries are held in strictest confidence. Call or write:

*Management Resources Agency*

1370 Brea Boulevard • Suite 124 • Fullerton, California 92635

## DATA PROCESSING CONSULTANT

We are a national CPA firm with an expanding Management Services Department. Our Chicago office has an opening for a business-oriented data processing professional with 2-4 years experience and good communications skills. Experience in any of the following areas would be considered a plus:

Corporate Systems Department  
Big 8 Management Services  
Mini-Computer installations  
Manufacturing, Distribution, Health Care, Accounting

A college degree is required. We offer a professional environment, minimum travel, excellent benefits and an opportunity for varied assignments.

If you qualify, and are seeking a challenging career opportunity, send us your resume with salary history. All replies will be held in the strictest confidence.

CW Box 1404  
797 Washington Street  
Newton, Mass. 02160  
Equal Opportunity Employer

## PROGRAMMER ANALYST

A central Ohio manufacturing plant engaged in heavy machining of truck axle components (low volume, high variety), has a challenging opportunity as a Programmer Analyst for a sharp, aggressive individual with career objectives in mind.

To be considered for this position, you should possess a minimum of 2 years of experience with the IMS/DL1 experience and/or familiarity with manufacturing systems would be a plus. Degree preferred.

This position requires a great deal of interaction, cooperation and leadership abilities. Growth potential limited only by successful candidate's own capabilities.

We are a progressive division of a large multi-national corporation, offering a superior fringe benefit program and salary commensurate with experience.

Only qualified candidates should send resume, with current salary, to:

CW Box 1405  
797 Washington St.  
Newton, Mass. 02160  
An Equal Opportunity Employer M/F

## UNIVERSITY OF PETROLEUM AND MINERALS DHAHRAN, SAUDI ARABIA MINI COMPUTER SYSTEMS SPECIALIST

The Systems Engineering Department is seeking a qualified computing professional to provide systems support and real time development on HP 21MX. To install and maintain operating systems, systems programs and applications programs including on line applications. To assist in teaching laboratory sessions and research. To estimate and develop-order software tools and supplies and write interfaces for satellite micro-computer systems.

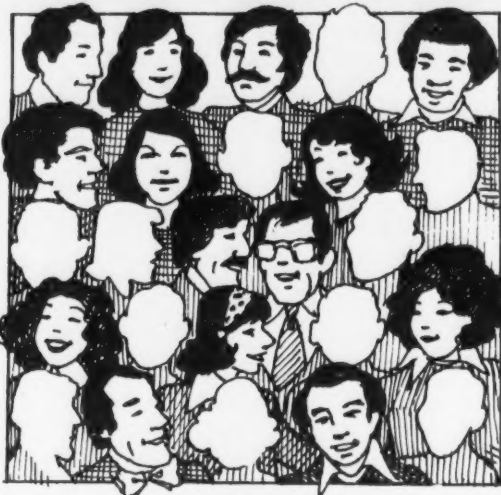
Masters degree in a relevant field with 2-3 years exposure to HP Minicomputer assembly programming and operation. Experience with refreshed graphics programming and teaching.

Minimum regular contract for two years, renewable. Excellent salaries and allowances. Air conditioned housing provided, free air transportation to and from Dhahran each two-year tour. Attractive educational assistance grants for schoolage dependent children. Local transportation allowance in cash each month. All earned income without Saudi taxes. Ten and a half month duty each year with 45 days vacation paid.

Apply with complete resume on academic and professional background, list of references, and with copies of degrees including personal data such as, family status (spouse's name, names of children, ages and sexes, home and office addresses, telephone numbers to:

Dhahran International Airport  
P.O. Box 144  
Dean of Faculty and Personnel Affairs  
University of Petroleum and Minerals  
Dhahran, SAUDI ARABIA

## FOURTEEN OF OUR TOP TWENTY-FIVE SALES ENGINEERS NEVER SOLD COMPUTERS BEFORE THEY CAME TO DATA GENERAL.



They were Software Support Engineers, Systems Programmers, Hardware Designers...you name it.

The point is this: You can stick to your job for the next 18 months, or become a Sales Engineer at Data General, sell computers for a year—and you'll make the same money. Or more. You already have the technical credentials and, if you enjoy dealing with people and working in a competitive environment, there's no limit to what you can earn as a Sales Engineer at Data General.

We give you more of what you need to be successful: computers, peripherals, technology, reputation, position—over 44,500 Data General computers have been sold and installed in 45 countries around the world. Stay where you

are, or move up to Data General—it's your future.

### COMPUTER SALES ENGINEERS

We require solid technical background in mainframes, minis or systems—plus the ability to open up new OEM and end user accounts is a must.

#### NORTHEAST

Cambridge, MA New Haven, CT Nashua, NH Worcester, MA 128 Belt, MA  
Wellesley, MA Hartford, CT

To apply for a position in one of the above locations call Charley Polachi collect at (617) 235-8171, or send your resume, including salary history, in confidence to him at Data General Corp., 888 Worcester Rd., Wellesley, MA 02181.

#### MID ATLANTIC

New York City, NY

To apply for a position in the above location call Dick Rausch collect at (212) 557-1122 or send your resume, including salary history, in confidence to Ralph Wertheimer, Data General Corp., 150 Broad Hollow Rd., 3rd Floor, Melville, NY 11746.

Long Island, NY Westchester County, NY

To apply for a position in one of the above locations call Ray Tellalian collect at (516) 427-0311 or send your resume, including salary history, in confidence to Ralph Wertheimer, Data General Corp., 150 Broad Hollow Rd., 3rd Floor, Melville, NY 11746.

Albany, NY Syracuse, NY Buffalo, NY

To apply for a position in one of the above locations call Dave Crago collect at (716) 385-2000 or send your resume, including salary history, in confidence to Ralph Wertheimer, Data General Corp., 150 Broad Hollow Rd., 3rd Floor, Melville, NY 11746.

Wayne, NJ

To apply for a position in the above location call Alan Goldman collect at (201) 785-3910 or send your resume, including salary history, in confidence to Ralph Wertheimer, Data General Corp., 150 Broad Hollow Rd., 3rd Floor, Melville, NY 11746.

Princeton, NJ Philadelphia, PA Harrisburg, PA Scranton, PA

To apply for a position in one of the above locations call Art Mackin collect at (215) 643-5515 or send your resume, including salary history, in confidence to Ralph Wertheimer, Data General Corp., 150 Broad Hollow Rd., 3rd Floor, Melville, NY 11746.

#### MIDWEST

Detroit, MI Minneapolis, MN Kansas City, MO Milwaukee, WI Des Moines, IA  
Indianapolis, IN Schaumburg, IL St. Louis, MO Kalamazoo, MI Madison, WI  
Dayton, OH Pittsburgh, PA

To apply for a position in one of the above locations call Yvette Britt collect at (312) 885-0505 or send your resume, including salary history, in confidence to her at Data General Corp., 1111 Plaza Dr., Schaumburg, IL 60172.

#### SOUTHWEST

San Diego, CA Pasadena, CA Downtown Los Angeles, CA Orange County, CA

To apply for a position in one of the above locations call John Bennett collect at (213) 973-0401 or send your resume, including salary history, in confidence to him at Data General Corp., 2221 Rosecrans Ave., Suite 204, El Segundo, CA 90245.

#### SOUTHEAST

Miami, FL Atlanta, GA Memphis, TN Ft. Worth, TX Baton Rouge, LA  
Tampa, FL Nashville, TN Columbia, SC Tulsa, OK Jackson, MS  
Houston, TX Knoxville, TN Orlando, FL New Orleans, LA Huntsville, AL  
San Antonio, TX

To apply for a position in one of the above locations call Allen Sabourin collect at (404) 325-3181 or send your resume, including salary history, in confidence to him at Data General Corp., 1639 Tullie Circle, Suite 128, Atlanta, GA 30329.

#### FEDERAL REGION

Richmond, VA Metro Washington Norfolk, VA

To apply for a position in one of the above locations call Stan Joseph collect at (301) 247-8900 or send your resume, including salary history, in confidence to him at Data General Corp., 1900 Sulphur Spring Rd., Suite 310, Baltimore, MD 21227.

#### NORTHWEST

Palo Alto, CA San Francisco, CA Seattle, WA Denver, CO

To apply for a position in one of the above locations call Terri Johnson collect at (415) 321-8010 or send your resume, including salary history, in confidence to her at Data General Corp., 2445 Faber Pl., Palo Alto, CA 94303.

DataGeneral

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## PROGRAMMER/ANALYSTS

# If You Had To Look Back At '77 With No Professional Growth - Then Look Ahead To '78 With CSC!

The System Sciences Division of Computer Sciences Corporation

continues its expansion into the New Year with challenging and stimulating professional opportunities for those looking to the future.

We continue to offer the qualified individual an environment that provides opportunities to develop professional skills and allows upward mobility into technical and managerial career paths.

We are currently staffing positions in support of contracts with the Federal Aviation Administration and with the National Aeronautic and Space Administration. The FAA project, located in Jacksonville, Florida, deals with the development of an air traffic control system. We additionally have several NASA projects in the Washington, D.C. Metropolitan area, requiring scientific or technical programming background. Investigate your future with our division.

## JACKSONVILLE, FLORIDA

We are seeking experience in IBM 360/OS, Assembly (BAL) and/or high level language (preferably JOVIAL) to work in any one of the following areas:

- Software test and validation including development of tools to test and validate real-time software systems
- Simulation/modeling of air traffic patterns. Knowledge of JOVIAL a plus
- Design and implementation of data base management systems
- OS/360 System generation and maintenance
- Diagnostic design, development or enhancement and hardware orientation
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## WASHINGTON, D.C. METROPOLITAN AREA:

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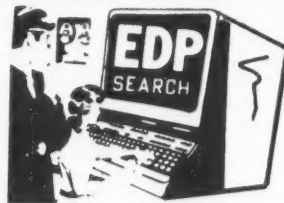
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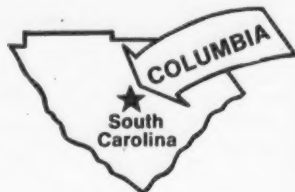
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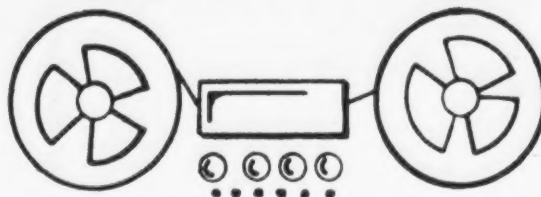
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Applications oriented with extensive FORTRAN experience. Engineering (preferably nuclear) or scientific background needed. Other backgrounds considered if work experience is appropriate. Capabilities required include analytical ability to design, program and implement systems of programs, ability to take over existing systems of programs, ability to learn and use several different computer systems and ability to communicate with systems users. Responsibilities include both new and existing system development and maintenance, system utility maintenance and assisting users. Areas of interest include worldwide fuel cycle requirements and schedules, reactor operating characteristics and implementing fuel cycle systems on customers' hardware. Salary open.

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Qualified and interested candidates are invited to submit resumes, in complete confidence, to James McCullom, Employment Representative, LAWRENCE LIVERMORE LABORATORY, P.O. Box 808, Dept. JCW-018, Livermore, CA 94550. U.S. Citizenship Required.



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Here's how we can help the job you're looking for find you.

If you're looking to explore career opportunities locally or nationally, contact us. We recruit experienced PROGRAMMERS • SYSTEMS ANALYSTS • SOFTWARE SPECIALISTS and SALES REPRESENTATIVES for companies nationwide, at no cost to the applicant.

Here's how our service works. After we receive your resume, we (1) can make it instantaneously available, via computer, to our network of CYBERSEARCH® placement offices in major cities across the country. (2) Trained placement consultants at each office can then refer your resume to companies seeking EDP professionals with your qualifications. So instead of one office and one consultant, you can have all the offices of CYBERSEARCH searching the data processing job market for you. To protect your identity, your name and present employer's name are not included in the computer file.

When interest is expressed, your personal CYBERSEARCH consultant will contact you and arrange an interview. This service is available without cost to you now, or upon hire. All fees are paid by the employer.

To put your resume into circulation fast, call or write the EDP Dept. at the CYBERSEARCH office nearest you.

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19004  
215-667-2400

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## INFORMATION SYSTEMS CONSULTING

Booz, Allen & Hamilton, one of the largest and most prominent worldwide management consulting, technology and marketing research firms, seeks several highly skilled professionals to join our Chicago consulting practice. For those qualified, our consulting practice offers a unique opportunity to assist the top management of our client companies in dealing with the business and technical issues in their information systems plans and developments. The successful candidate will have:

- A BS degree; an MBA/MS desirable;
- Industry experience in manufacturing, banking or insurance;
- A minimum of 3 years of diversified experience in computer planning, implementation, and evaluation, including:
  - Project planning, financial analysis, requirements definition, design and development of data bases, performance evaluation;
  - Familiarity with large scale hardware/software offerings of major vendors;
  - In depth applications experience in financial manufacturing, or general business operations.
- An ability to apply your technical skills in a top level business environment.

We offer an exceptional opportunity to utilize your academic and business experience, to broaden your functional skills, and to increase your exposure to a number of industries.

To confidentially explore this opportunity, send a resume or letter describing employment and salary history to:

**BOOZ ALLEN**

BOOZ-ALLEN & HAMILTON

Gil Stenholm, Booz, Allen & Hamilton, Dept. ISS-6, 135 S. LaSalle, Chicago, Illinois, 60603. We are an equal opportunity employer, M/F

## ANALYST PROGRAMMERS

M.I.S. International, an internationally known computer systems integration and management consulting organization, requires specialized professionals for top assignments in southeastern Michigan, Indiana and Ohio areas. MIS is developing advanced systems in:

- Financial Systems, Process Control, Communications, IMS, IDS, & DMS.

Knowledge of the following computers is desirable:

- MICROCOMPUTERS: Motorola 6800
- MINICOMPUTERS: PDP-11, SPC-6
- LARGE COMPUTERS: B6700/4700, IBM 370, H6000, U1100

Top salaries, fully paid fringes include life, health and dental insurances, moving allowance and educational benefits. To arrange an interview, call or send your resume to Mr. Gene Bryant.

**M.I.S. INTERNATIONAL, INC.**

31350 Smith Road  
Romulus, Michigan 48174  
(313) 326-7010

## SR. PROGRAMMER/ANALYST

Eugene, Oregon heavy equipment mfg. seeks degreed person with minimum two (2) years experience with manufacturing information system and project leader level.

Familiarity with RSTS/E, Basic Plus and Basic Plus II, PDP 11/45 hardware, total (DBMS), and/or MRP is strongly desired.

Excellent fringe benefit package, salary negotiable. Forward resume to:

P.O. Box 607  
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## PROGRAMMERS PROGRAMMER/ANALYSTS SYSTEMS ANALYSTS

A State-Of-The-Art  
Technological Opportunity

Santee Cooper, an aggressive, growth oriented electric utility located in the heart of the beautiful south, has several immediate and challenging opportunities for computer professionals. These opportunities have been created by our long-term commitment to a total system redesign and provide challenging and professional growth opportunities.

Our environment is IBM 370 under OS-VSI, IMS-VS, DB-BC, ANSI COBOL and Fortran IV. Microwave TP Network.

We offer excellent income commensurate with your experience, a generous benefits package and excellent working conditions in an employee-oriented organization. Santee Cooper is located in a year-round recreational area near historic Charleston, S.C. **FOR IMMEDIATE AND CONFIDENTIAL ATTENTION, PLEASE SEND YOUR RESUME AND SALARY REQUIREMENTS TO:**

Ms. T. Matthews  
Industrial Relations



223 N. Live Oak Drive  
Moncks Corner, SC 29461

An Equal Opportunity Employer M/F

## SYSTEMS PROGRAMMER

Expansion has created a new position of Systems Programmer at our manufacturing/distribution facility in Sanford, N.C. Responsibilities include operating system and software evaluation, installation, testing and maintenance; tuning and optimizing operation environment; serve as Data Base Administrator for any installed data base management system; provide technical support for systems, programming and operations staff; interface with New York CIS Technical Services on software/hardware; and, develop in-house software in support of operations and program development.

Incumbent must be a college graduate with a major in an appropriate field and three years of programming experience in an IBM 370 DOS/VS environment, or equivalent combination of education and experience. The incumbent should have additional qualifications of generation and maintenance support for on-line (CICS/TASKMASTER) systems, spoolers (POWER-VS/ASAP), software such as DFAST, EPAT and LIBRARIAN.

Coty is located in an ideal setting for family-living and year-round recreation. As a Division of a Fortune 200 Corporation, we offer an excellent salary and benefit program plus the opportunity for professional growth within Coty and the Pfizer organization.

Please send resume, including salary information in complete confidence, to

John R. McDonald, Personnel Manager  
**COTY DIV. PFIZER, INC.**  
P.O. Box 1026, Sanford, N.C. 27330  
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## Programmer/Analyst Come Grow With Us!

We are seeking new individuals with a professional attitude who have the experience and the ability to grow in the consulting environment.

This outstanding professional opportunity offers:

- Stimulating work environment
- A policy of internal promotions
- Professional and technical education
- Above average salaries
- A fully paid benefits plan

Currently we have openings for individuals who have a thorough knowledge of either of the following:

- Oil and gas applications background
- Honeywell large systems, GCOS, GMAP
- IBM Systems/7, MFP7 Macros/TPMF Macros
- COBOL, IMS, TSO, SPF, OS/VS/MVS.

Please call, or send your resume to:

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30400 Telegraph Road, Suite 386  
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(313) 642-2900  
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## REAL-TIME PROGRAMMERS

NCR's Terminal Systems Division in Millsboro, Delaware is a high volume manufacturing facility concerned with the design and production of POS terminals. We are currently experiencing substantial increases in Engineering activity and as a result have immediate needs for programmers interested in growth opportunities.

### Desired Experience

#### -Systems

- I/O Drivers
- Diagnostics
- Operating Systems

#### -Applications

- Vocationally oriented to the Retail Market
- Peripheral development to include scanners, communications, data collection, etc.

### Basic Qualifications

- 1-3 years experience in Assembly language with mini or microcomputers 8080 experience a plus
- BS in CS, EE or Math

In addition to excellent career opportunities with NCR, our Millsboro location is right in the heart of the Delmarva Peninsula, better known as the "land of Pleasant Living." We're just minutes from marine recreational areas, wildlife preserves and the nation's finest beaches.

Please send resume with salary requirements:

Ron Tull, Dept C-123  
Terminal Systems Division  
NCR Corporation  
P.O. Box 607  
Millsboro, DE 19966

**NCR**

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### M.I.S. OPPORTUNITIES

Our clients urgently need computer professionals for the following positions that are mostly unadvertised and exclusively listed with our firm. Chicago, Cleveland, Philadelphia and other locations.

#### SYSTEMS MANAGERS \$28-\$37K

Degreed individuals with technical background and some management experience in mfg. industry.

#### SR. SYSTEMS ANALYSTS \$24K-\$32K

Experience in finance and/or mfg. applications. Must have successfully handled a major project. Good communications skills and technical knowledge.

#### DATA BASE ADM. \$24K-\$32K

Must know IMS DB/DC or DMS II. Experienced in design and adm. of data base management systems.

#### PROGRAMMER ANALYSTS \$16K-\$25K

OS or DOS/COBOL or BAL — join our team. Will train in CICS and data base.

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Call or write in confidence. Our specialists speak your language. All fees paid. No contracts. Licensed pvt. empl. agency. (312) 298-1148.

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### PROGRAMMER ANALYST

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Empl. & Comp. Admin.  
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Public Service Corp.  
77 Grove St.  
Rutland, VT 05701

## DATA PROCESSING SYSTEMS ANALYSTS/ PROGRAMMERS Midwest Area

We are seeking degreed people with COBOL programming on IBM 370/OS; Data Base techniques utilizing IMS preferred; on-line programming disciplines with manufacturing or accounting background desirable. We are a \$350 million company and one of the leaders in the automobile aftermarket field — a major division of a top Fortune 50 Corporation.

We offer an excellent salary, fringe benefits plus relocation expenses.

Send resume including salary history in confidence to:

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### Managers of Business Systems Development

The Information Processing Services Department of MIT is interested in hiring a person to direct the activities of systems analysts involved in the development of new information systems for the Institute. Qualified candidates must have in depth knowledge of university information systems and strong managerial experience. In addition they should be familiar with large scale systems software, operating systems, telecommunications and data base management applications. Please submit resume to: MIT Personnel Office, 400 Main St., Cambridge, MA 02139, Attn: Job No. A77-80. An equal opportunity/affirmative action employer.

Department of  
Information Systems  
Georgia State University  
Faculty position available Fall, 1978. Candidates should be interested in teaching and research in the area of organizational applications of computers including management information systems, systems analysis and design, data processing organization and management, or data-base design. Candidates must possess the Ph.D. degree or have completed all requirements for that degree except the dissertation. Rank and salary are open and competitive. Send vita and names of three references to: William W. Cotterman, Chairman, Department of Information Systems, Georgia State University, University Plaza, Atlanta, GA 30303. Georgia State University is an equal educational and employment institution.



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## INFORMATION SYSTEMS PROFESSIONALS

Bell Helicopter Textron, the world's leading helicopter manufacturer, is embarking on a long range program to develop and upgrade major information systems in the manufacturing/material areas. We are offering challenging opportunities in the following positions:

### SYSTEMS ANALYSTS

Responsible for design, development, implementation and maintenance of manufacturing oriented data base systems. Applications include Bill of Material/Requirements Planning, Master Scheduling, and Shop Floor Control.

### COMPUTER PROGRAMMERS

Responsible for writing, testing and implementing COBOL programs as part of a development team comprised of programmers, analysts, and data base administrators. Includes both on-line and batch applications.

### HARDWARE SPECIALISTS

Responsibilities include hardware maintenance, problem resolution, maintenance scheduling, communication network support and performance analysis.

The environment that you will be working in includes IBM 370/168, MVS, IMS, MARK IV, UCC-10, TSO, JES2, PANVALET and TMS.

Our sunbelt location in the Dallas/Ft. Worth metroplex offers ideal year-round living with the advantages of a major metropolitan area. We offer competitive salaries and excellent benefits.

For immediate consideration, forward your resume (include salary progress) to:

**EMPLOYMENT MANAGER  
BELL HELICOPTER  
TEXTRON  
P.O. BOX 482  
FT. WORTH, TEXAS 76101**

**Bell Helicopter**

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**TEXTRON**  
Division of Textron Inc.

## PROGRAMMER/ ANALYSTS

**370/168 OS/VS**

Leading publisher of chemical information services needs experienced assembler language Programmer/Analysts. IBM 370 and/or PDP-11 experience is desirable.

We are a large installation operating chemical information and associated business information systems in both batch on-line modes. State of the art environment includes:

- \*ON-LINE INTERACTIVE PROGRAMMING
- \*STRUCTURED PROGRAMMING
- \*DISTRIBUTED PROCESSING
- \*DATA BASE MANAGEMENT SYSTEMS

We need successful people with proven skills. A college degree or equivalent experience is required. We offer competitive salary, a professional environment, good growth potential and an attractive benefit package which includes paid dental insurance, continuing education program, flexible working hours, and liberal vacations. If you qualify please write to:

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Columbus, Ohio 43210

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## PROGRAMMERS

*We're Serious About Improving  
The Quality Of Your Career  
And Your Lifestyle!*

The Data Processing Department of Hennepin County (which includes Minneapolis and surrounding suburbs) is one of the leaders in the Data Processing Applications industry for both hardware and software.

Our continued growth and achievements has created a dynamic and challenging opportunity for the individual who is seeking unparalleled growth and development in a highly professional and demanding environment.

This position requires a minimum of 1 year COBOL programming experience and offers excellent opportunities in a large scale IBM shop (370/168, MVS, IMS). In addition we provide a liberal salary (to 17K) commensurate with your experience, a comprehensive benefits package and a unique lifestyle in the Minneapolis-St. Paul area that offers the ideal blend of year-round recreational, educational and cultural activities.

If you're serious about improving your future, talk to us at Hennepin County.

WRITE IN CONFIDENCE TO:

**Hennepin County**

David R. Sier  
A-3 Government Center  
Minneapolis, Minnesota 55487

An Equal Opportunity Employer M/F

## CONTRACTS

The Burroughs Corporation, a leader in the Data Processing Industry, is seeking two career-oriented individuals for the international contracts activity.

The ideal candidates will be well versed in international business policies and contracting practices and will have the ability to interact affectively with all levels of management. The ability to communicate fluently in either French, German or Japanese is a necessity. An MBA or an MBA/JD with contract and negotiation experience, together with some background in the data processing industry is highly desirable.

We offer excellent personal and professional growth opportunities along with a competitive salary and fringe benefit package.

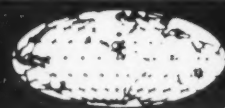
For prompt and confidential consideration, please direct your resume including salary history to:

B.W. Keyes

**BURROUGHS CORPORATION**

One Burroughs Place  
Detroit, Michigan 48232

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## SYSTEMS ANALYST

Progressive MIS Department of expanding national meat packer/processor seeks individual to join its corporate systems and programming staff in Southfield, Michigan.

Qualified applicants will have a minimum of 3 years experience as a Systems Analyst in a manufacturing environment. Experience in NCP, VTAM, or V/M is a plus.

We offer the opportunity for advancement in addition to an attractive salary and benefits package. Send resume in complete confidence to: Corporate Personnel Manager.

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## COMPUTER PROFESSIONALS



**IF YOUR CAREER DOESN'T OFFER ENOUGH FUTURE,**

... General Refractories provides both growth and excellent compensation in an interesting working environment. Please investigate these positions, and if you qualify, contact us immediately for complete details.

### SENIOR SYSTEMS ANALYSTS

This is a key position for the experienced Project Leader possessing systems analysis and design experience. A knowledge of programming is essential, as well as user training, forms design and procedures writing experience.

In addition, a second professional opportunity exists requiring the above qualifications with supplemental experience in data base design, preferably using TOTAL or IMS. Manufacturing Systems Design experience is necessary. You will be ideally qualified for this position if you have experience with shop scheduling systems, bill of materials processing, MRP, and Standard Cost Systems.

### APPLICATIONS PROGRAMMER/ANALYST

The select candidate will possess 3 years experience as a Programmer utilizing COBOL and JCL and a college degree or the equivalent of 2-4 years experience as a Programmer/Analyst. You will be responsible for developing computer programs and implementing information systems while working closely with systems specialists or independently. This will involve the development of detailed project plans including estimates of the design, programming, procedure writing, and documentation requirements, the preparation of program specifications, and the coding, testing, and debugging of computer programs. You will develop instruction manuals, instruct systems users and train less experienced data processing personnel.

### APPLICATIONS PROGRAMMER

Drawing on your 3 years experience as a programmer using COBOL and JCL, you will be responsible for converting specifications into working programs and implementing systems. In addition to your programming duties, you will work with the systems analysts to plant projects and develop estimates of programming requirements and train less experienced personnel.

For immediate consideration, please send your resume including work history and salary requirements, in confidence to: Director, Employee Relations.

## GENERAL REFRATORIES COMPANY

600 Grant Street/Room 3000  
Pittsburgh, PA 15219

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## MARKETING/MANAGEMENT OPPORTUNITY

### COMPUTER LEASING

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We are a dynamic young company with an outstanding reputation in the data processing community. Continual rapid growth necessitates the opening of several new branch locations.

Requirements call for a strong track record selling data processing equipment or services to top management levels. Candidates should have a good working knowledge of intermediate and large scale IBM systems. A college degree is preferred. Prior leasing experience is desirable, but not necessary.

This is not just another sales job. It provides outstanding earnings potential, and an excellent career path.

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(800) 631-1244 or (404) 449-4400

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Tele/Resources, a vigorous leader in the interconnect telephone and electronics communications industry has a challenging opportunity for a software development specialist. You will play a key role in the design and development of a real time operating system as a member of a results oriented Hardware/Software development team. B.S. degree in computer science or related field and 2 plus years of assembly and high level languages. Experience in operating systems, familiarity with modern operating system theory, data entry and management systems desired.

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For additional information and consideration reply in strict confidence including salary history to Ms. Lynne Tryon, Personnel Administrative Assistant (518) 877-8571.



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## PROGRAMMERS

Los Angeles County's Data Processing Department has career opportunities for programmers experienced in major EDP applications. Experience in the development and maintenance of financial, election, assessment, welfare, justice, health care and engineering applications in an IBM 370/TSO/RJE/IMS, Univac 1100/TIP/IMS, COBOL or FORTRAN environment is particularly desirable.

### PROGRAMMER ANALYST I

\$1415/a month to start

These positions require: TWO YEARS EXPERIENCE IN COMPUTER PROGRAMMING UTILIZING COBOL or Basic Assembler language within the last 3 years, for medium-to-large scale third generation computers. This experience should have been in the use of structured design and programming methods such as HIPO, top down development, structured programming, walk through, and program design languages.

Those professional assignments offer career stability and excellent employee benefits. Please reply to:



Los Angeles County  
Data Processing Department  
Personnel Office (Room PO4)  
9150 E. Imperial Highway  
Downey, CA 90242  
(213) 923-7721 or 771-5421 Ext. 2936  
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COMPENSATION TO \$50,000

## WANTED: INDUSTRY LEADERS IN ADVANCED COMPUTER SYSTEMS SOFTWARE DEVELOPMENT Southeastern U.S.

Our Client, a well established and rapidly growing manufacturer of Computer Systems has engaged Davies Associates to assist them in identifying a few "Industry Leaders" for challenging assignments in Advanced Computer Software Systems and Software Project Management. They are seeking innovative professionals who can personally contribute to the conceptual design and development of future Real-time, Multi-Programmable Computer Systems. Areas of interest include: Operating Systems, Data Base Management, Compilers, Language Development, Communications Hardware and Software Integration, Peripherals Development, Firmware and Virtual Computer Systems.

These positions offer exceptional career development opportunities in a stimulating professional environment. Liberal relocation and full company benefits package is provided. For additional information:

CALL Chuck White, COLLECT  
WEEKDAYS: 10a.m. to 6p.m.  
(301)-657-3510

If a call is not convenient, we invite you to forward, in confidence, a brief letter or resume outlining your qualification and career interests to:

### DAVIES ASSOCIATES, INC.

Personnel Consultants

7101 Wisconsin Ave., Bethesda, Maryland 20014

EOE M/F/H

Agency

### UNIVERSITY OF VERMONT ANALYST/PROGRAMMER I

The Office of Management Information and Computing is seeking an Analyst/Programmer with two to four years of college and coursework in math or business related fields. Applicants must have three to six years of experience in systems analysis and programming, two of which must be in systems analysis; COBOL and IBM/DOS required. Applicants with experience in higher education applications, on-line systems or DBMS preferred. We offer an excellent benefits package. Salary commensurate with qualifications. Send resume and references by February 6 to University of Vermont, Personnel Office, Box 57D, Waterman Building, Burlington, Vermont 05401. An Affirmative Action Employer.

### Executive Director of Computing/Data Processing

The University of Wisconsin-Stevens Point is seeking an Executive Director of Computing/Data Processing Services. Reports to the Assistant Chancellor for University Services and is responsible for instructional computing, research computing, administrative data processing, administrative systems, and public service computing functions. Salary: \$25,000. Qualifications: PhD preferred, Masters required, and successful managerial experience in computing/data processing or systems.

Apply by February 1, 1978 to Dr. David Coker, Assistant Chancellor for University Services, University of Wisconsin-Stevens Point, Stevens Point, Wis. 54481. Telephone: (715) 346-2641. Equal opportunity, affirmative action employer.

## RAYTHEON

### Santa Barbara, California

Raytheon Electromagnetic Systems Division, located in the beautiful Santa Barbara California area, has immediate openings in the following areas:

### E.S.M. SYSTEMS ENGINEER

Senior level engineer in the receiver, microwave, digital and software disciplines. Responsibilities include all aspects of ESM Systems Engineering including: analyses, syntheses, design monitoring & review & systems test planning, integration and validation of test results. Approximate 7 years of related experience is preferred.

### SOFTWARE/SYSTEMS

**SOFTWARE** - Define NTIS/EW interface requirements and design and develop associated software. Design and develop diagnostic software for a large scale military EW system. Requires BSEE or Computer Science degree with experience in real time development and FORTRAN programming.

**SYSTEM ENGINEERS** - To perform subsystem design and analysis of computer controlled ESM/ECM system. Will be responsible for development of system error budgets and analysis of system performance. Requires coordination with design groups.

Please send resume with salary history to:  
Employment Office Dept. CW

## RAYTHEON

Electromagnetic Systems Division

6380 Hollister Ave.

Goleta, CA 93017

Equal Opportunity Employer M/F  
U.S. Citizenship Required



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## TELECOMMUNICATION SPECIALISTS

### Data Communications

We are a rapidly growing service bureau located in beautiful Valley Forge, Pa. Enlargement of our Data Communications Department has created the need for two technicians to troubleshoot and diagnose problems in our international network. Must have extensive user equipment familiarity and be able to interface with users and management.

Experience with TDM, FDM and high speed modems is a must. Some travel will be required. We offer an attractive starting salary, a superb benefits package and exceptional opportunity for career growth in a highly progressive atmosphere.

Send resume, with salary history in confidence to:

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## OS/VSI SYSTEMS SOFTWARE PROGRAMMER

Responsibilities will include generation and maintenance of vendor software and development of in-house software in an IBM 370/148 environment. Software programming experience preferred. Experience in some of the following areas would be helpful:

- \*OS/VS
- \*VM/370
- \*Assembly Language
- \*CICS
- \*COBOL
- \*DOS/VS

We offer an excellent benefit program. Growth potential on proven performance. Send resume or call in confidence:

T.L. Boyer, Personnel Director

## FARM BUREAU INSURANCE

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**FARM BUREAU**

data processing

## PROGRAMMERS

Key Positions with Our Winning Computer Consulting Team in Springfield, IL., Indianapolis and Chicago.

If you're skilled in COBOL, ALC and/or PL-1 and have at least a 2 year success record of accomplishment with large scale IBM systems under IMS... we have the programming and system challenges to match your expertise. These positions require high productivity.

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since 1966  
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## SYSTEMS PROGRAMMERS

### DO YOU.....

Have 3-5 years experience? Get tired of multi-year projects? Want a variety of machine experience? Desire compensation equal to performance? Like a small company environment? Have an interest in compiler writing?

Excellent fringe benefits  
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Prog Anal-Cobol ..... to \$22K  
Prog Anal-CICS ..... to \$22K  
Prog Anal-PL1 ..... to \$20K  
Prog Anal-Retail ..... to \$20K

For the above positions, as well as others respond to: 6100 N. Keystone, Suite 657, Indianapolis, IN 46220 (317) 257-9281.

SW Pennsylvania locations  
Sup Info Sys-Mfg ..... to \$30K  
EDP Auditor ..... to \$28K  
Sys Prog-370/MVS ..... to \$23K  
Prog Anal-370/Cobol ..... to \$22K

For the above positions, as well as others, respond to: #4 Gateway Center, Suite 1705 Pittsburgh, PA 15222 (412) 391-6545

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SYSTEMS**  
Licensed Employment Agency

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Telecommunications  
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1-3 years exp. in bank applications. IBM 360/370 sites. Career opportunity. Fee and relocation expenses paid.

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## MINICOMPUTER SPECIALIST

If you're the kind of person who can't resist a challenge, here it is - Mini expert (no specific hardware) who can jump in and solve client problems for this software consulting firm. Exp in hardware configuration and systems design. \$33,000, FEE PAID

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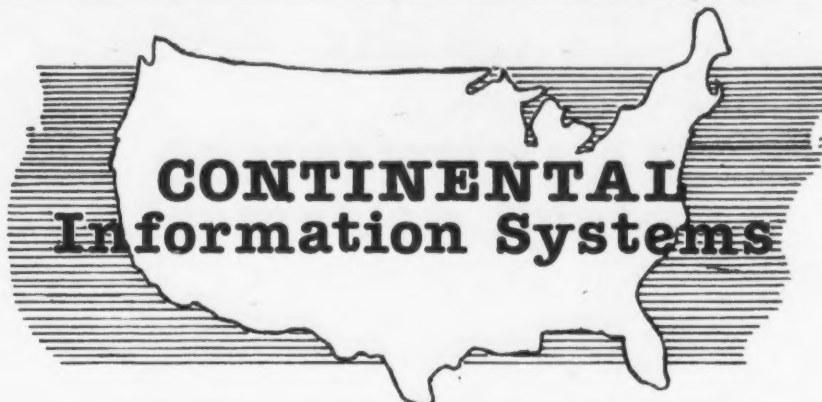
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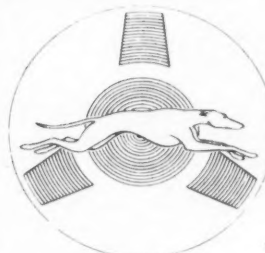
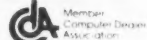
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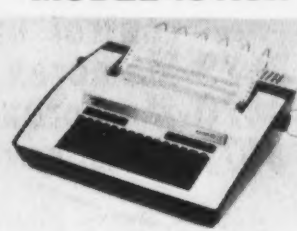
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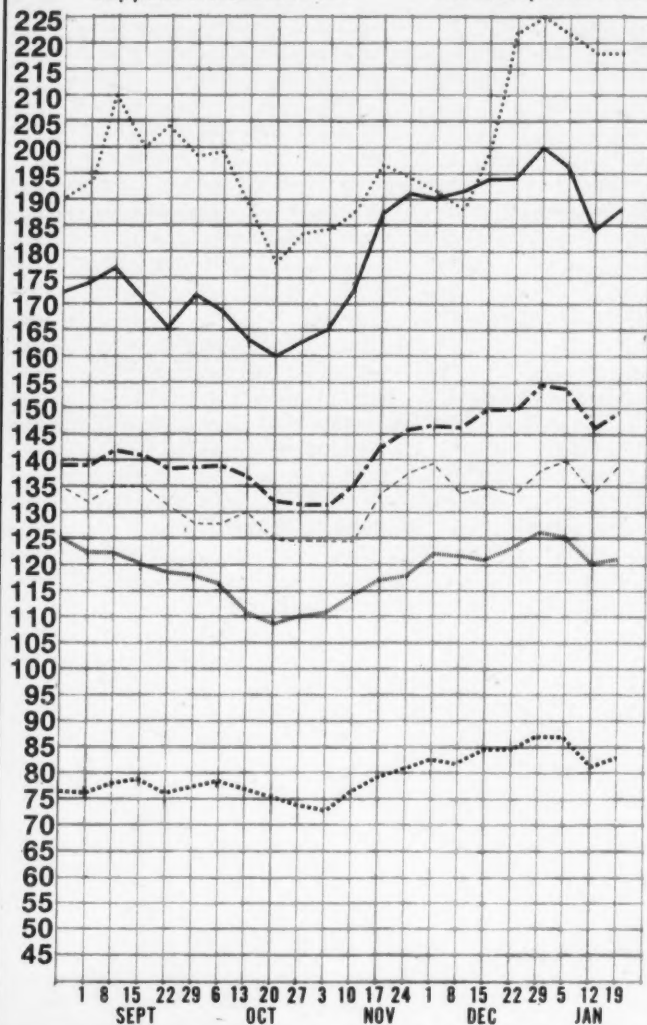
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# Earnings Reports

**ON-LINE SYSTEMS**  
Three Months Ended Oct. 31

### ON-LINE SYSTEMS

Three Months Ended Oct. 31

	a1977	1976
Shr Ernd	\$41	\$36
Revenue	5,718,519	3,984,429
Earnings	360,854	307,680
6 Mo Shr	.77	.66
Revenue	10,036,758	7,616,938
Earnings	673,044	565,187

a-Includes operations of Atkins Computer Services UK and Time-sharing B.V., acquired in second quarter of 1977.

## PENRIL

Three Months Ended Oct. 31

	1977	1976
Shr Ernd	\$ .18	\$ .14
Revenue	2,829,469	2,243,689
Earnings	225,493	170,111

## TCC

Three Months Ended Sept. 30

	1977	1976
Shr Ernd	\$ .02	\$ .03
Revenue	1,170,721	1,062,500
Earnings	15,756	26,935
6 Mo Shr	.06	.06
Revenue	2,240,499	2,163,156
Earnings	45,888	44,122

### TERMINAL DATA

Year Ended Sept. 30

	1977	1976
Shr Ernd	\$ .71	\$ .83
Revenue	7,555,000	6,115,000
Tax Cred	22,000	230,000
Earnings	513,000	605,000
3 Mo Shr	.23	.26
Revenue	1,995,000	1,776,000
Tax Cred	.....	29,000
Earnings	166,000	196,000

## DPF

Three Months Ended Nov. 30

	1977	1976
Shr Ernd	\$ .46	\$ .18
Revenue	113,252,000	106,754,000
Tax Cred	325,000	90,000
Earnings	1,949,000	737,000
6 Mo Shr	1.00	.71
Revenue	222,145,000	213,955,000
Tax Cred	721,000	328,000
Earnings	4,215,000	2,941,000

a-Restated

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## Computerworld Stock Trading Summary

CLOSING PRICES WEDNESDAY, JANUARY 18, 1978

All statistics compiled,  
computed and formatted  
by  
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Cambridge, Mass. 02139

E X C H	PRICE				E X C H	PRICE				E X C H	PRICE						
	1977-78 RANGE (1)	CLOSE JAN 18 1978	WEEK NET CHNGE	WEEK PCT CHNGE		1977-78 RANGE (1)	CLOSE JAN 18 1978	WEEK NET CHNGE	WEEK PCT CHNGE		1977-78 RANGE (1)	CLOSE JAN 18 1978	WEEK NET CHNGE	WEEK PCT CHNGE			
COMPUTER SYSTEMS					SOFTWARE & EDP SERVICES												
A	AMDAHL CORP	22-55	48 3/4	+2 3/8	+5.1	O	ADVANCED COMP TECH	0-2	1 1/2	0	0.0	O	DATA ACCESS SYSTEMS	4-5	3 1/4	0	0.0
N	BURROUGHS CORP	55-91	67 1/8	+1/2	+0.7	O	ANACOMP INC	7-10	8 1/2	+1/8	+1.4	O	DATA 100	6-11	9 1/4	+5/8	+7.2
O	COMPUTER AUTOMATION	18-30	24	+3/4	+3.2	A	APPLIED DATA RES.	5-10	8 3/4	+1/2	+6.0	A	DATA PRODUCTS CORP	9-19	15 1/2	+1/2	+3.1
N	CONTROL DATA CORP	23-29	25 3/4	+1/4	+0.9	N	AUTOMATIC DATA PROC	23-30	26 3/4	-5/8	-2.3	O	DATA TECHNOLOGY	3-4	4 1/8	-1/8	-2.9
O	CRAY RESEARCH INC	15-31	27 1/2	+1 1/2	+5.7	O	COLEMAN AMERICAN COS	2-2	1 3/4	0	0.0	O	DATUM INC	1-2	2	0	0.0
N	DATA GENERAL CORP	35-54	48	+7/8	+1.8	O	COMPU-SERV NETWORK	9-15	13 1/4	0	0.0	O	DECISION DATA COMPUT	2-3	3 1/8	+1/8	+7.1
N	DATAPoint CORP	18-41	36 3/8	+1 3/8	+3.9	O	COMP ELECTRON SYSTEMS	6-10	9 1/4	-1/4	-2.6	O	DELTA DATA SYSTEMS	6-11	10 7/8	+1 1/8	+20.8
N	DIGITAL EQUIPMENT	37-53	44 7/8	+1/4	+0.5	O	COMPUTER HORIZONS	1-1	3/4	0	0.0	O	DATARAM CORP	2-24	19 1/2	+1/2	+2.6
N	ELECTRONIC ASSOC.	2-3	2 3/8	-1/4	-9.5	O	COMPUTER NETWORK	6-11	9 1/4	-1/8	-1.3	N	ELECTRONIC M & H	4-5	4 3/8	+3/8	+9.3
A	ELECTRONIC ENGINEER.	8-14	11 7/8	-3/8	-3.0	N	COMPUTER SCIENCES	7-10	8 7/8	+5/8	+7.5	O	FABRI-TEK	1-2	1 1/8	0	0.0
J	FOUR-PHASE SYSTEMS	13-23	19 1/2	+1	+5.4	O	COMPUTER TASK GROUP	1-2	1 1/2	0	0.0	O	GENERAL COMPUTER SYS	0-2	1 1/2	0	0.0
N	FOXBORO	28-54	30 1/8	+1/2	+1.6	O	COMPUTER USAGE	1-3	1 5/8	0	0.0	N	HAZELTINE CORP	8-12	9 7/8	+1/4	+1.2
O	GENERAL AUTOMATION	6-9	7 1/8	+1/2	+7.5	O	CONSHARE	5-8	6 3/4	+3/4	+12.5	N	HARRIS CORP	28-47	40 1/2	+3/8	+1.8
O	GRI COMPUTER CORP	1-1	5/8	0	0.0	O	DATA DIMENSIONS INC	3-5	4 5/8	+1/4	+5.7	A	INCO TERM CORP	10-19	18 1/2	+5/8	+3.4
N	HEWLETT-PACKARD CO	69-87	70 5/8	+1 1/8	+1.6	O	DATATAB	1-2	1 3/8	0	0.0	O	INFOREX INC	4-7	5 3/4	+1/8	+2.2
N	HONEYWELL INC	43-55	44 3/4	+1 1/8	+2.5	N	ELECTRONIC DATA SYS.	14-20	14 7/8	+1/4	+1.7	O	INFORMATION INTL INC	8-14	9	+1/2	+5.8
N	IBM	245-286	269 1/4	+3 1/8	+1.1	O	INSYTE CORP	2-3	1 1/4	+1/8	+11.0	O	INTEL CORP	38-57	42 1/2	+1	+2.4
O	MANAGEMENT ASSIST	5-10	9	+3/8	+4.3	O	IPS COMPUTER MARKET.	1-2	2 1/4	0	0.0	A	LUNDY ELECTRONICS	3-6	3 1/2	+1/8	+3.7
O	MICRODATA CORP	7-18	10 1/4	0	0.0	O	KEANE ASSOCIATES	3-4	3 3/8	0	0.0						
O	MINI-COMPUTER SVST	7-12	7 1/4	-1/2	-6.4	O	KEYDATA CORP	1-3	1 3/8	+1/8	+10.0						
O	MODULAR COMPUTER SYS	5-9	7 1/4	0	0.0	A	LOGICON	7-17	11 7/8	+5/8	+5.5	J	MSI DATA CORP	6-15	12 3/4	+1 1/4	+10.8
N	NCR	32-47	38 7/8	+1 5/8	+4.3	A	MANAGEMENT DATA	1-2	1 1/4	0	0.0	O	MEMOPAC	23-34	27 3/8	+1/8	+0.4
O	PRIME COMPUTER INC	12-25	22 1/2	+2	+9.7	A	NATIONAL CSS INC	10-18	17	+1 1/8	+7.0	N	MOHAWK DATA SCI	5-8	5 3/4	0	0.0
N	PERKIN-ELMER	17-22	18 1/4	-1/4	-1.3	O	NATIONAL DATA CORP.	4-7	6 7/8	+1/8	+1.8	O	PENNILL CORP	2-6	5 3/8	-1/8	-2.2
N	RAYTHEON CO	16-35	29 5/8	+3/8	+1.2	A	ON LINE SYSTEMS INC	16-22	16 3/4	-1/8	-0.7	N	PERTEC CORP	7-11	10 1/8	+1 1/2	+17.3
N	SPERRY RAND	30-42	35 1/4	0	0.0	N	PLANNING RESEARCH	3-6	4 1/4	+1/8	+3.0	O	POTTER INSTRUMENT	2-2	1 3/4	0	0.0
O	SYCOR INC	8-20	19 7/8	+1	+5.2	O	PROGRAMMING & SYS	1-1	5/8	+1/8	+25.0	O	PRECISION INST.	2-2	2	0	0.0
A	SYSTEMS ENG. LABS	5-13	12 1/2	+1 1/8	+9.8	O	RAPIDATA INC	2-3	2 7/8	+3/8	+15.0	O	QUANTOR CORP	3-5	3 3/8	+1/8	+3.8
A	WANG LABS.	10-14	12 3/4	+3/4	+6.2	O	REYNOLDS & REYNOLD	17-21	19 1/4	+1/4	+1.3	O	RECOGNITION EQUIP	6-10	7 1/8	+1/8	+1.7
						O	SCIENTIFIC COMPUTERS	1-4	3 5/8	-1/8	-3.3	O	SCAN DATA	1-2	7/8	-	-6.2
						O	TYMSHARE INC	14-23	20	-1/4	-1.2	O	STORAGE TECHNOLOGY	10-22	19 3/4	+5/8	+3.2
						A	URS SYSTEMS	4-5	4 3/4	+1/8	+2.7	O	T BAR INC	7-13	11 1/8	+1/8	+1.1
						N	WVLY CORP	1-2	3/4	-	-7.0	O	TALLY CORP.	4-6	4 1/8	+1/8	+3.1
												A	TFC INC	7-10	6 7/8	+1/8	+1.8
												N	TEKTRONIX INC	29-40	35	+1	+2.9
												N	TELEX	2-3	2 7/8	0	0.0
												O	TESDATA SYSTEMS CP	13-20	14	+1/2	+3.1
												O	WILTEK INC	1-1	1/2	0	0.0
LEASING COMPANIES					PERIPHERALS & SUBSYSTEMS					SUPPLIES & ACCESSORIES							
O	ALANTHUS CORP	3-6	5 3/4	+1/8	+2.2	N	ADDRESSOGRAPH-MULT	10-16	13 7/8	-1/8	-0.8	A	AMERICAN BUS PRODS	6-8	7 1/8	0	0.0
O	BOOTHIE COURIER CORP	8-14	13 1/2	+1/4	+1.8	O	ADVANCED MEMORY SYS	7-9	7 3/4	+1 1/8	+16.9	O	BALTIMORE BUS FORMS	1-4	1 7/8	0	0.0
O	COMDISCO INC	10-16	15	+1/2	+3.4	N	AMPEX CORP	8-11	11 1/8	+0	+9.8	A	BARRY WRIGHT	10-17	15 1/2	+7/8	+5.9
A	COMMERCE GROUP CORP	1-3	3/4	0	0.0	O	ANDERSON JACOBSON	3-6	4 7/8	0	0.0	O	CYBERMATICS INC	1-1	7/8	0	0.0
A	COMPUTER INVSTRS GRP	1-2	3/4	0	0.0	N	APPLIED DIG DATA SYS	10-20	13 1/4	+5/8	+4.2	O	DUPLEX PRODUCTS INC	14-20	18 1/8	-1/4	-1.3
N	DATRONIC RENTAL	0-2	1 1/4	0	0.0	O	BEEHIVE INT'L	5-12	5 5/8	+1/8	+2.9	N	ENNIS BUS. FORMS	6-9	8 5/8	+1/2	+6.1
A	DCL INC	1-3	2 7/8	0	0.0	A	BOLT, BERANEK & NEW	6-9	6	+1/4	+4.3	O	GRAPHIC CONTROLS	13-18	17 3/4	+1 1/4	+7.5
N	DPE INC	6-10	8	0	0.0	N	BUNKER-RAND	8-13	11 7/8	+7/8	+7.9	N	3M COMPANY	45-56	47 1/2	+1 1/4	+2.7
N	DTL	13-22	17 5/8	-3/8	-2.0	O	CALCOMP	3-5	5 2/8	+1/4	+9.5	O	MOORE CORP LTD	24-37	26 1/2	+1/4	+0.9
N	LEASCO CORP	19-27	24 1/4	+3/4	+3.1	O	CAMBRIDGE MEMORIES	1-4	2 7/8	+1/8	+6.9	N	NASHUA CORP	16-28	18 1/8	+3/8	+2.1
O	LEASPAC CORP	1-2	1 1/2	0	0.0	N	CENTRONICS DATA COMP	16-30	17	+1/4	+1.4	O	STANDARD REGISTER	18-25	21	-3/4	-3.4
A	PIONEER TEX CORP	5-11	5 3/8	-1/8	-2.2	O	COGNITRONICS	1-1	1	0	0.0	O	TAB PRODUCTS CO	8-19	7 5/8	0	0.0
N	U.S. LEASING	10-16	12 3/4	0	0.0	O	COMPUTER COMMUN.	5-8	6 1/2	-1/8	-1.8	N	UARC	18-22	19	-1/2	-2.5
						O	COMPUTER CONSOLES	4-7	3 3/4	0	0.0	A	WABASH MAGNETICS	10-15	11	0	0.0
						O	COMPUTER EQUIPMENT	2-4	3 1/2	+1/4	+7.6	N	WALLACE BUS FORMS	17-21	18 3/4	-1/8	-0.6
						O	COMPUTER TRANSCIVER	1-1	1 3/8	-1/4	-15.3						
						O	COMFEN	9-13	9 5/8	+1/8	+1.3						
						N	CONRAC CORP	19-28	20 3/4	0	0.0						
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